July 1974

Smithsonian

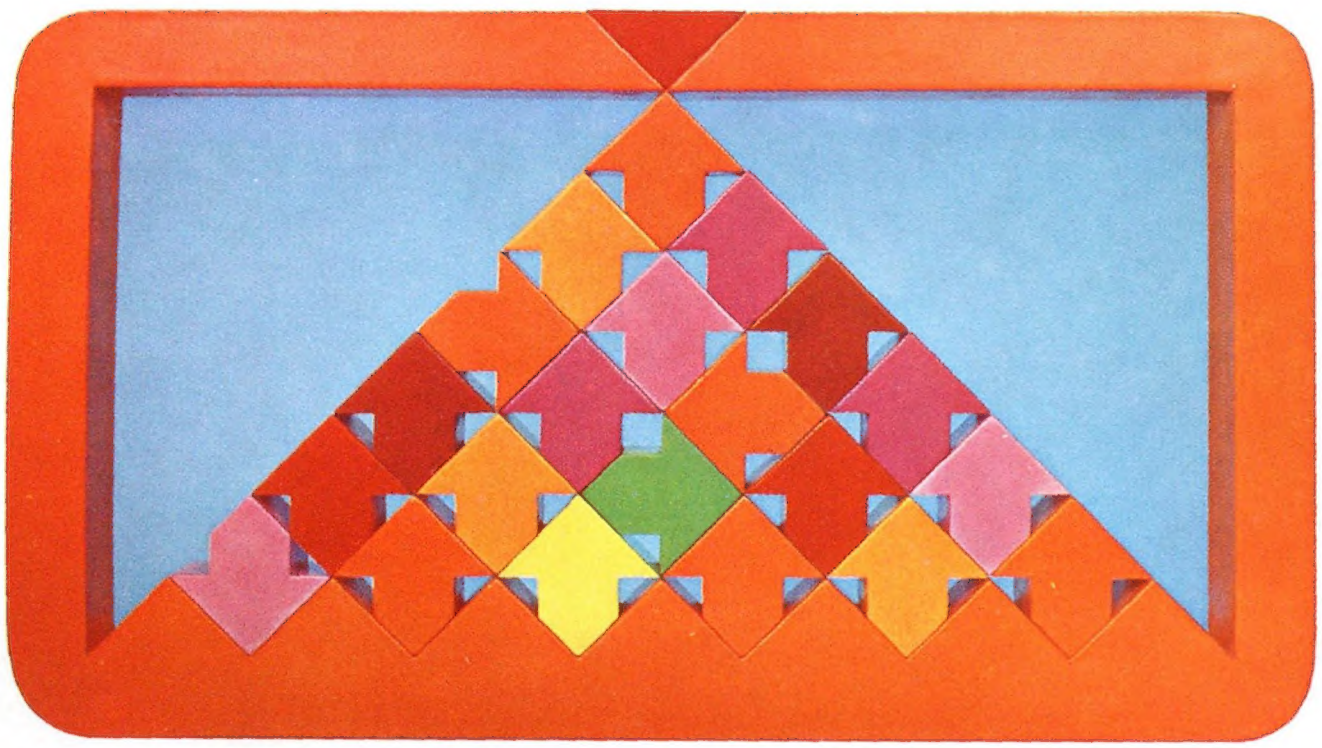
Replica of Drake's *Golden Hinde* prepares to sail for California (p. 62)

photographer: marty evans

The real

Our election laws and traditions reflect the country as it was decades ago. The time has come to ask some basic questions.

How long should elected officials serve?
Is there still a need for the electoral college?
Should taxpayers foot the bill for election campaigns?
Does our present system truly provide one vote for each person?
Is our political structure so big that officials are too far from those who elect them?



artist: per vollquartz "government: triangle and people"

The ideal

A nation in which those elected truly represent the will of those who elected them– for the good of all.

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Conversation Pieces

Technically intriguing items from TRW, guaranteed to add luster to your conversation and amaze your friends.

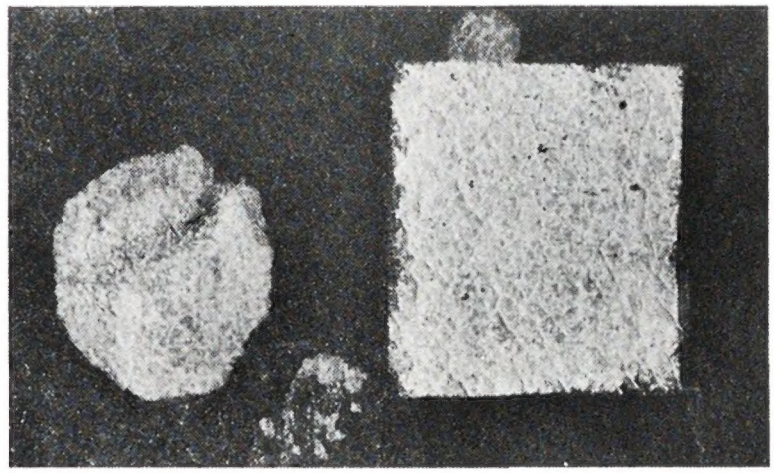
Cleaning up a Queen's Complexion The beauty of Venice, Queen of the Adriatic, is far more than skin-deep. Many of her buildings are masterpieces of medieval and renaissance architecture. They're embellished with esthetically priceless statuary and other sculpture. And it's all being blackened and eroded by smog from suburban industry. Even works of art that are housed within the public buildings and palazzi of this magnificent city are under attack. Conventional cures, such as chemical solvents or sand-blasting, threaten to do more damage than the disease itself.

Recent experiments show, however, that a laser beam can be used to remove pollutants and reveal the natural stone or wood finish beneath. This hopeful discovery was a by-product of a joint effort by TRW's Dr. Ralph Wuerker and Dr. John Asmus of the University of California, San Diego, who suggested the idea of laser-powered dry cleaning. The main objective, though, was to see if holography would be a practical way to foil both Father Time and human vandals by preserving the three-dimensional ghosts of famous sculptures.

Wuerker and Asmus were completely successful. The holograms they made in Venice demonstrated that a whole art gallery of sculpture can be recorded on a carton full of glass plates and recreated by projection anywhere in the world. These three-dimensional images are so lifelike that they even show parallax when the observer moves from one position to another. The experiments proved that major international exhibits of sculpture in holographic form can now be delivered by parcel post, while the originals stay safely in their home museums.

Other proposed uses of holography range from advertising displays and truly three-dimensional movies to new types of security systems. At TRW, holographic memories have been developed which can store a whole library in a space the size of a briefcase. The technique is also being used in rocket and jet engine development to show previously invisible details of gas flow and the behavior of high-speed particles. These studies are expected to result in improved turbine-blade and rocket-nozzle designs. Holographic interferometry has also been used to refine spacecraft microwave dish antennas to accuracies far superior to those that are possible with conventional computer methods. Other nondestructive industrial testing techniques are under development and Dr. Asmus continues to improve his methods of restoring art.

Dr. Wuerker aligns a ruby laser and holographic plate to recreate a three-dimensional image of a twelfth-century Madonna and Child, by an unknown Spanish sculptor.



Marble fragment, spot-cleaned by a single, brief pulse of laser energy, reveals its pristine color and texture. The technique is so precise it can be controlled so that only recent encrustations are removed while the natural patina of old stone remains unharmed. Even stone that has been seriously weakened (to a structural strength equivalent to that of a sugar cube, for example) is not further weakened by laser cleaning.

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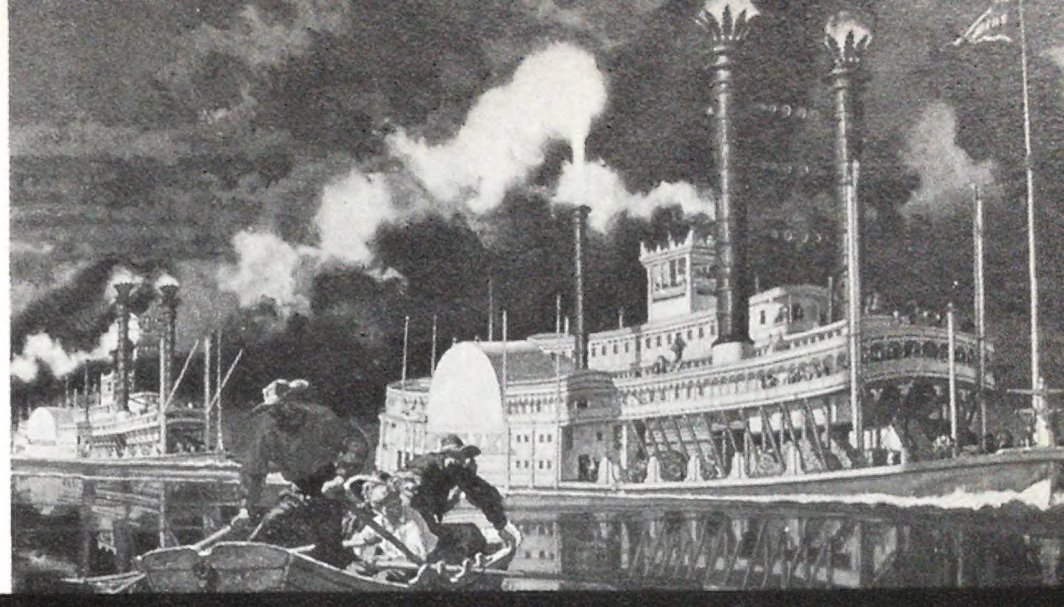

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Secretary Ripley's comments

The view from the castle

The successful reintroduction of barn owls to one of our towers was not only for the sake of tradition but of biological harmony

By far the most heartening thing that has happened in Washington this past spring is that barn owls have come back to the Mall. Many years ago, one of my predecessors, as keeper of the Smithsonian Castle, closed the windows high up in one of the fanciful towers of the building, a tiny turret that, without rhyme if with artistic reason, decorates the structure à la Neuschwanstein. And so, their loft closed by bureaucratic stricture, the owls flew silently away.

Meanwhile, as tourists multiplied on the Mall, the Fine Arts Commission decreed that uniform, functional and artistic rubbish holders be placed everywhere amidst the rows of elms, so that the folk could pile their paper bags and cartons and crusts of picnic litter in overwhelming heaps at designated sites. Then, in due course, pesticides of various sorts were banned in proper observance of new-Earth morality.

Like Man himself, rodents are cunning and fecund, and soon the Mall was swarming like Hamelin town. So for reasons of biological harmony as well as tradition we have brought the owls back to the tower.

Skilled aviculturists at the National Zoological Park conditioned a pair of barn owls to breed in captivity. As with all such monolithic war plans, a back-up strength of barn owls was deployed for emergency substitutions should they be required.

Let me report only that all has gone well. Despite outcries from humanitarians that cruelty to owls might be our real purpose, humane societies and the ASPCA may now calm their fears. In mid-winter the real-Earth owls were installed in their loft by patient volunteers who fed them dead rats or mice every day. Inspections were not without hazard: I received a well-placed calling card on my right eye as I looked into the darkened upper loft one day, and one of my colleagues was raked on the temple by the indignant father barn owl as he attempted to peer at the nest. Mother and father barn owl are busy rearing the young, the window has been reopened and father nightly sallies forth to survey the litter on the greensward below.

It will take a while to discover whether the owls really like the Mall after some 20 years' absence. Washington has changed mightily since the calm of the Eisenhower years. There are too many people and a largely unseen plethora of rats. If, to paraphrase Shakespeare, "lions roar in the streets and the geese call on the Capitoline Hill," no one hears them anymore. The Goths and Visigoths have long since arrived at all levels of society without anyone having noticed. All restraints on language and human usage of humans have long since gone out the window. Whereas words involving pornography or explicit sexual acts and phrases of sacrilege were once banned from common use, now almost the only banned words in our language involve nuclear war. No other social inhibitions seem to exist.

And yet amidst this familiarity and casual mockery of spirituality and the procreative mysteries, the realities and renewals of nature continue all around us. Even on the Mall, that trampled, heaped symbol of the people's park, downy woodpeckers have nested this year, the chimney swifts arrived to nest in our chimneys, warblers filtered through the trees in their crepuscular fashion—and barn owls can once again be seen gliding round our towers. Let us take heart in such renewals.

S. Dillon Ripley

The window is open again in the Castle's northwestern tower (the one at far right in engraving opposite).

Curatorial assistant Susan Lehman climbs up into the owls' tower bearing a feast of laboratory rats.

Of six young barn owls that hatched this last spring, two peer from under the mother's protective wing. One of the six has since vanished, replaced by an egg, and the five remaining young ones are flying.

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...when Andrew Jackson coldly replied to a series of nullificationist toasts: "Our Union: it must be preserved."

...when tearful Confederate veterans at Appomattox "tenderly fold their flags, battle-worn and torn, blood-stained, heart-holding colors, and lay them down."

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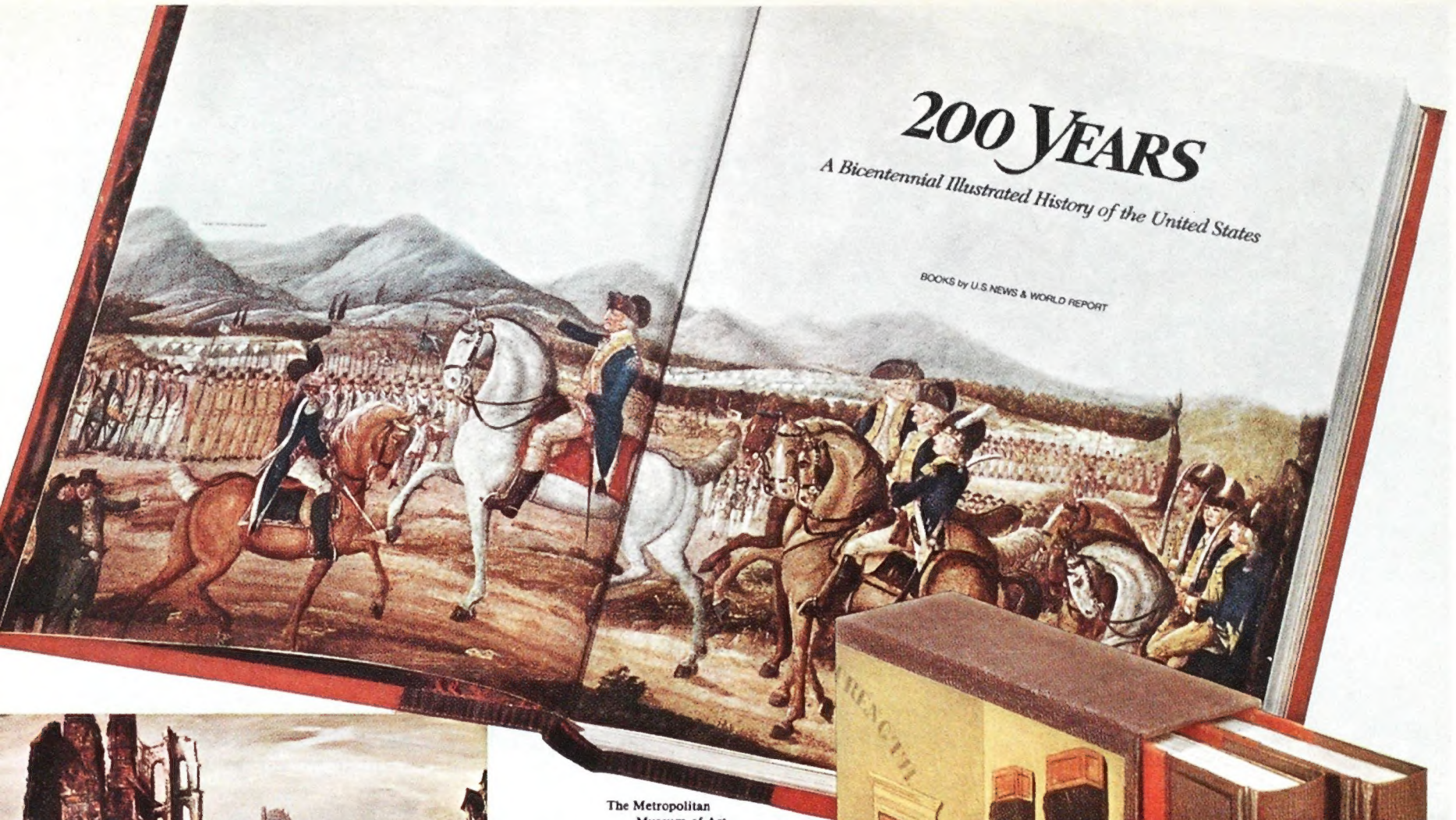
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2

Civic Center Commission, City of Detroit

Allied Breakthrough at St. Lo, after 2500-plane attack, opened the way to Paris in World War II.

New York Historical Society

Lincoln Lantern was carried atop a pole during the 1864 campaign parades in New York.

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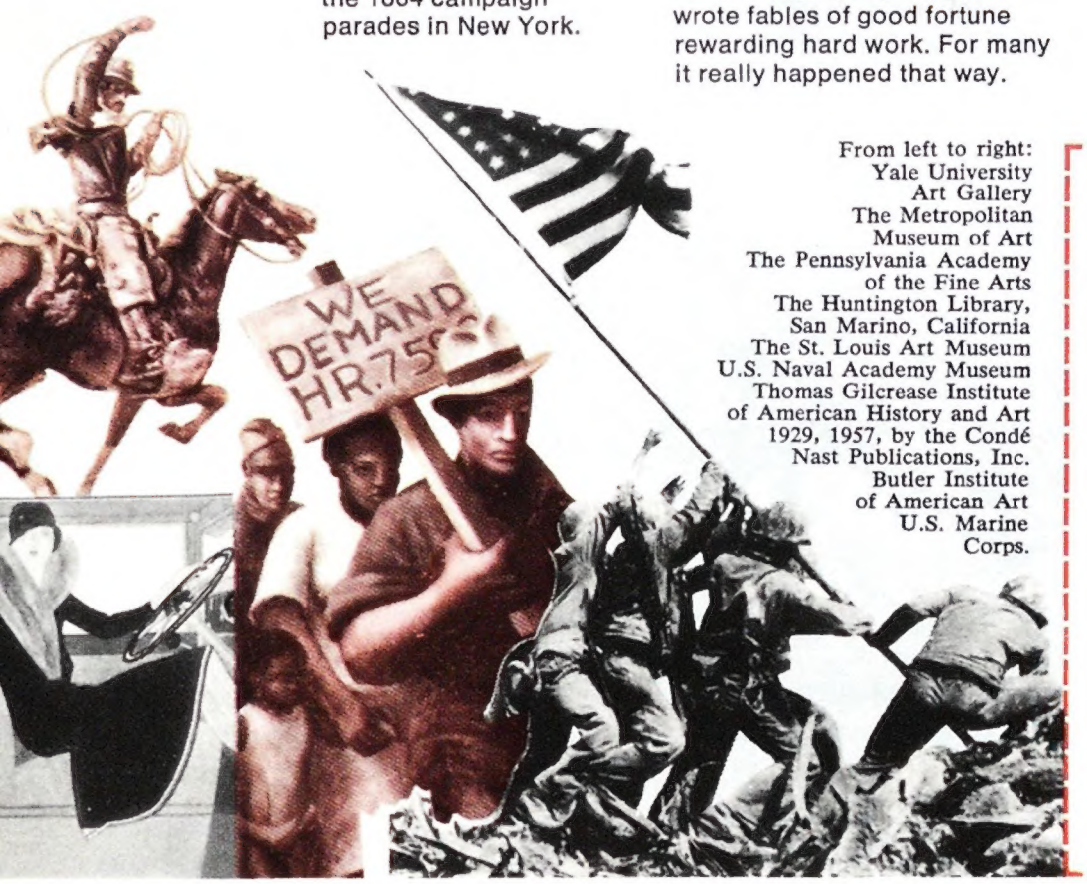
Horatio Alger, Jr., wrote fables of good fortune rewarding hard work. For many it really happened that way.



From left to right:
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The Pennsylvania Academy of the Fine Arts
The Huntington Library, San Marino, California
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Phenomena, comment and notes

Tales of sharks and rabbits; new remedies for the control of crime, population and beach loss

Fred Astaire once sang, "When an irresistible force such as you—meets an old immovable object like me . . . something's gotta give." And in the case of beaches and winter storms, it is protective sea walls and groins that usually do the giving, followed by the beach.

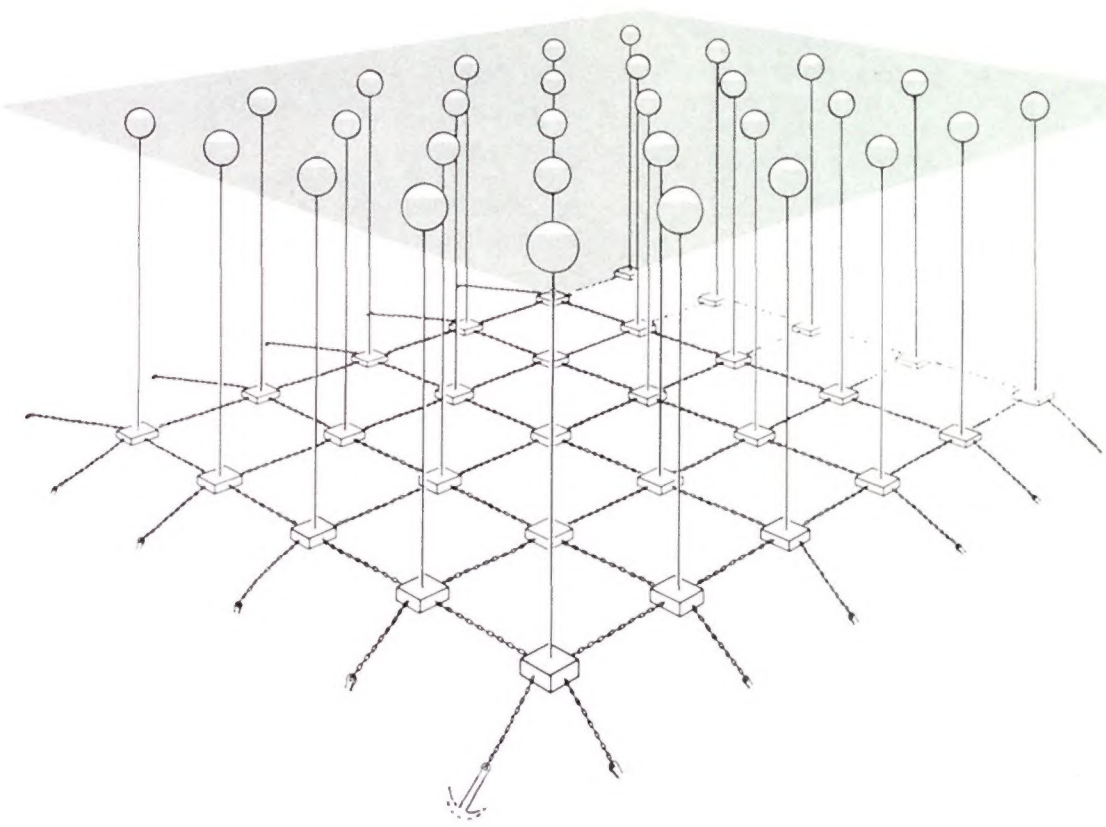
A solution may have been found by Richard Seymour and John Isaacs of Scripps Institution of Oceanography: Have the irresistible force meet a *movable* object. After a couple of years of study, Seymour began experimenting in a simulated miniature harbor in which he has anchored 1,800 Ping-Pong-ball-sized plastic spheres (see below). Aligned in rows, the spheres float rather like gas balloons just at the surface of the water. As a simulated wave enters the "harbor," it pushes the spheres ahead of it to the limit of their tethers, at which point they swing back against the wave, literally using the wave's own energy to slow it.

Plans have been made for a full-sized array of spheres (each five feet in diameter) to be installed in some yet-to-be chosen California harbor, according to the National Oceanic and Atmospheric Administration. Advantages—if the idea works—are that such arrays would be cheaper than breakwaters and easy to install or to remove when not needed.

King Canute would no doubt approve.

High-technology Hawkshaws

A new market for high technology just may exist in the business of law enforcement and crime control. *Science* magazine recently reported on an annual Crime Countermeasures Conference held at the University of Kentucky. If some of the gizmos offered there seem far out to you, they also seemed a bit far out to the police. For example, for only $3 million



Anchored all around to the bottom so they will rise and fall with the tides, an array of big plastic spheres in rows might take the sting from winter waves.

Your next can of beer may have been a Coors can that was a Falstaff can that was a Carling can.

The aluminum beer cans chilling in your cooler may have led other lives. Possibly as soft drink cans. Possibly as iced tea cans. Possibly as other beer cans. All because of aluminum's recyclability.

It's no secret that aluminum cans are popular with people. They like them because they're lightweight, chill quickly, open with a snap and are friendly to food. Unfortunately, some of these cans end up in places we'd prefer they didn't. Like streets, roads, woods and beaches. So, Alcoa's doing something.

Alcoa is supporting "Yes We Can" recycling programs in areas where there are enough aluminum cans to economically justify collection efforts. Cooperating recycling centers pay as much as 15 cents a pound for all-aluminum cans. People are picking them up. By the millions.

Through combined recycling center collections of the aluminum and beverage industries,

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Although aluminum is the most abundant metallic element in the earth's crust, recycling aluminum cans is a sensible way to help conserve this natural resource. It requires only 5 percent as much energy to recycle the metal in an aluminum can as it takes to make the metal in the first place.

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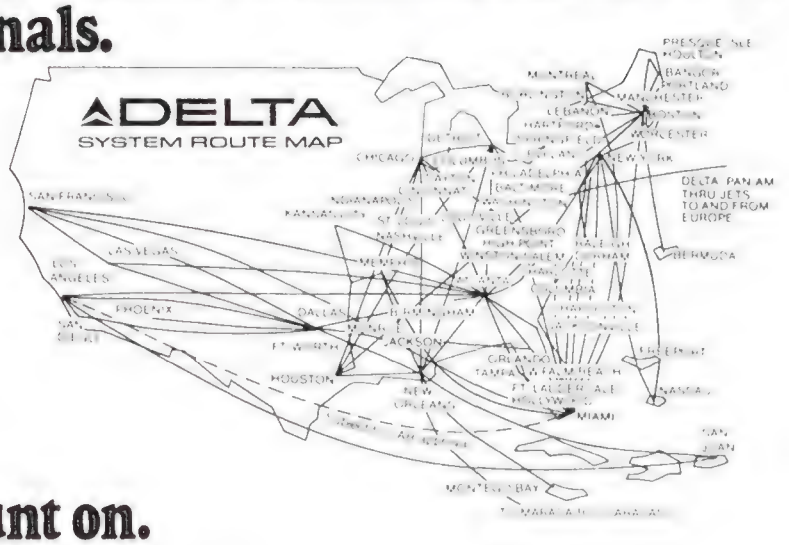

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a city the size of Detroit can now install an array of magnets under streets which will enable headquarters to know precisely where every squad car is at every minute of the day. One response: In New York City, all 2,000 squad cars are kept track of (more or less) by the less technologically gee-whiz expedient of having the drivers notify the dispatcher by radio. Another response: A lot of policemen aren't anxious to have their whereabouts pinpointed all that precisely.

Undaunted by such recalcitrance, the anticrime technologists press on, offering a variety of security devices to householders and companies. One such device, when implanted in the lawn, will inform a homeowner when anyone—*anyone*—steps anywhere on his lawn. Or it could be rigged to turn on the porch light. One foresees the future suburbanite crouching in his fortress still in terror—not so much of a burglar as of a short circuit.

Can men take the heat?

There is, one must admit, something unfair about placing the major burden of birth control upon women, but there the burden still remains, along with worrisome side effects that are much in the news. Men, of course, can have vasectomies and, according to *Science News*, about two-and-a-half-million American men have done just that—but here, too, there may be side effects. Mostafa S. Fahim at the University of Missouri School of Medicine found that, among other things, vasected rats have lower amounts of testosterone in the blood, gain weight and develop fat deposits on the liver. Vasectomies are also hard to reverse. So Dr. Fahim and his associates sought another scheme.

It had been shown that cold baths can improve both sperm count and motility in men; perhaps the reverse would be true. Fahim exposed the testes of rats to heat in varying degrees and from varying sources, such as infrared heaters and microwaves. The rats were found to be infertile for varying lengths of time and without recognizable side effects.

Most effective were ultrasound treatments: Sound-wave frequencies that are beyond the range of human hearing produce heat. No rat so treated was able to impregnate a female for eight months thereafter, or longer. Fahim has noticed no side effects whatsoever, and is now en-

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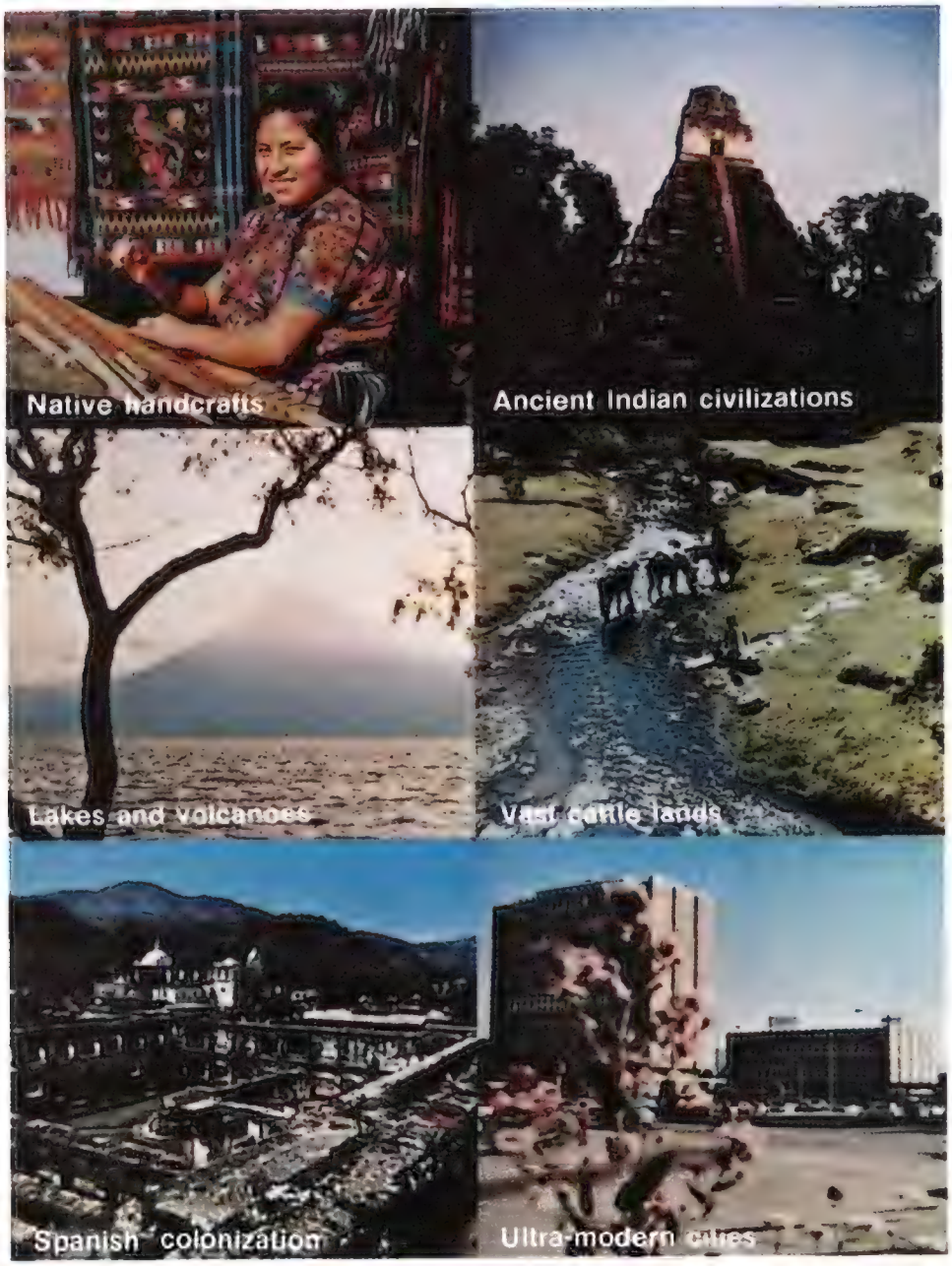

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gaged in making longer-term tests. Eventually he hopes to try ultrasound on humans, as well as using it for controlling the overpopulation of urban cats and dogs. Fahim is optimistic that his treatment will catch on; he says candidly, ultrasound is "like a massage. . . ."

Summer reading

Press releases are not generally a rich source of nostalgia, but one recent bulletin stating that Sandwich, Massachusetts, has received nearly three-quarters of a million dollars from the Bureau of Outdoor Recreation to acquire parkland set the memory synapses to firing. For among the lands the town of Sandwich expects to buy are some 57 acres known as the Briar Patch property, once inhabited by Thornton W. Burgess and a variety of creatures of his own imagination, including Peter Rabbit and Reddy Fox.

It was here in Sandwich, on most days, that Old Mother West Wind arrived in the morning and released from her sack the Merry Little Breezes that cavorted in the meadow. Sounds pretty corny, doesn't it? Well, don't reread the books. In a day when everyone has become more learned about the impropriety of anthropomorphism, Burgess' sugary tales are unreadable. Some imaginary worlds are better remembered than reexplored.

This is not to say that animal stories are for the birds, or even just for kids. Consider two recent adult best sellers.

Jaws by Peter Benchley is a depressing novel about the failure of people in response to a series of shark attacks off Long Island. Except for a couple of satisfyingly melodramatic chapters about the shark itself, it isn't much of a story, but it's scary enough in parts not to be recommended to anyone venturing to the beach.

Watership Down by Richard Adams is the kind of book only an Englishman could write. It recounts in detail the high adventures of a band of rabbits in a small (small to us, large to rabbits) piece of British countryside. It's all there—a complete lapine world—and if you can overcome any residual embarrassment you might feel if seen reading about rabbits at your age, take the book with you wherever you are going for vacation. Sappy old Peter wouldn't recognize any of the rabbits in *Watership Down,* but Burgess would have loved it nevertheless.

JAMES K. PAGE JR.

Première distribution des croix de la Légion D'Honneur. Detail from the painting by Jean-Baptiste Debret (1768-1848). On July 14, 1804, officers and soldiers of the Guard, magistrates, artists and other dignitaries came to the throne of Napoleon to receive the cross of the newly-formed Legion of Honor.

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Letters to the Editor

Grand Canyon

Dear Sir: Robert Wallace's article in the May issue, "Wooden boats plus Colorado rapids equals adventure," is a magnificent water-level view of the beauty of the Grand Canyon's Colorado River.

Rafts travel fewer than 30 miles daily, in approximately four hours. This leisurely schedule affords adventurers some six to eight hours daily to frolic at Elves' Chasm, float the last few hundred yards of the Little Colorado River and climb the canyon wall at Deer Creek Falls.
William M. Barnhardt
Charlotte, North Carolina

Dear Sir: Our baloney-boat trip was not rushed, but, even if it had been, we did not have three weeks to spend in a dory.
Marjorie Lovelace
St. Louis, Missouri

Dear Sir: If the dory trip takes three times as long but only one-third as many people, they eat three times as many meals, smoke three times as many cigarettes, and use three times as much toilet paper—and this adds up to just as much litter.
George W. Pratt
Scottsdale, Arizona

Dear Sir: I accompanied 16 friends and two guides on a 188-mile trip down the Colorado River by powered boat, but the motor was rarely used at full power, was not excessively noisy (certainly not as loud as the rapids) and did not exude gasoline fumes.
Florence Klemm
Colorado Springs, Colorado

Dear Sir: I am sure that the experience in a dory is different from, and possibly superior to, making the trip in a baloney boat as I did, but the choice should be left up to the individual traveler.
Paul Flaum
Kings Park, New York

Dear Sir: I don't row the Grand Canyon commercially anymore, but I did for 14 years, and in 1969 I retraced in a wooden rowboat all of the undammed remainder of Major Powell's route.

The river is not the same river it was for Major Powell. It is now waste water from Glen Canyon Dam. This means that the river level rises and falls daily in computerized response to hydropower generating demands in the West. The downstream velocity of the river changes with changed volume of discharge, handicapping boats that depend on current speed. On several occasions motor-steered trips have had to tow rowboats delayed by headwinds in low water, have given them supplies and taken injured members of a party to evacuation points. Another factor is that the river is colder than ever before because its water comes from deep behind a dam. The currents that can "peel a man like a banana" can also push or suck a person under and drown him regardless of an approved life jacket.

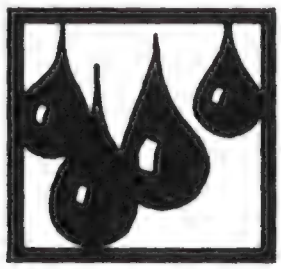
I stopped rowing Grand Canyon commercially because my river years showed me the difference between risking my own neck for the personal challenge and risking someone else's for hire. If the Colorado is designated as a rowing-only river, I think that will surely prove to be a tragic mistake.
Gaylord L. Staveley
Flagstaff, Arizona

Dear Sir: The boatman on my motor-driven raft had only one summer's experience and needed more. Dories aren't the only craft which require skill. Anyone who thinks horsepower alone is an answer to the force and turbulence of the Colorado has not been on the river.
Charlotte Reid
Atlantic Beach, Florida

Recycling

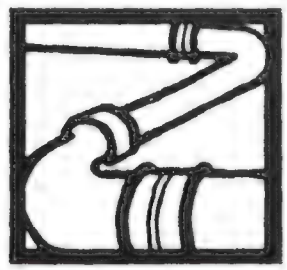
Dear Sir: Your timely article on recycling bottles and cans could have added that some cities are now selling waste paper for recycling at a relatively costly $58 a

We have only one proven source of energy for now...and the next 400 years



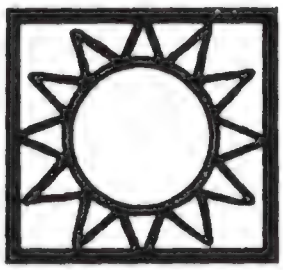
OIL

Known U.S. oil reserves are being depleted. The search is on for new discoveries. Meanwhile, we grow more dependent on imports.



GAS

Our known gas reserves are dwindling fast. Unless new sources are found, demand may soon exceed existing domestic supply.

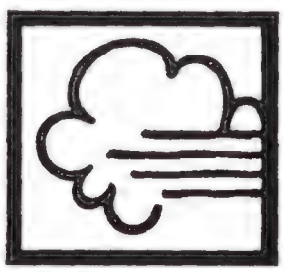


SOLAR

We would need perpetual sunlight. As yet, there's no full-scale, practical way to store energy from the sun.

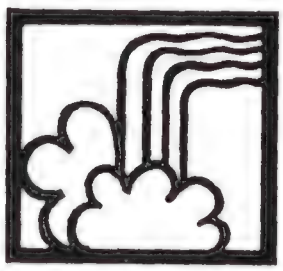
COAL

There's enough U.S. coal to last an estimated 400 years. Based on BTU values, coal makes up 88 per cent of the nation's energy reserves. Greater utilization of coal can keep our lights burning and our industry humming both now and for centuries ahead.



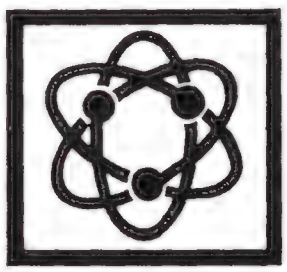
WIND

Too primitive. Windmills still work in some areas, but they're unreliable and inefficient.



WATER

Only about 4 per cent of the nation's energy comes from water power. And we've already harnessed our best sources.



NUCLEAR

Promising but slow in developing. Atomic power *may be* our best bet in years to come. Nuclear power today contributes about one per cent of U.S. energy.

Coal is vital to steel

Coal is needed in vast quantities to make steel. And the steel industry is a large consumer of electric power, of which coal is by far the largest source. Bethlehem mined more than 14 million tons of coal last year, and most of this was used in our own blast furnaces.

What about surface mining?

Surface-mined land can be reclaimed responsibly under present state reclamation laws. About 20 per cent of Bethlehem's coal is surface-mined while more than 50 per cent of the nation's coal is surface-mined. If unreasonable restrictions on surface mining are enacted, the nation may be in trouble. That includes all coal users. And steel users. And all who use electric lights and appliances would feel the pinch.

Why restrict our most abundant fuel?

We favor legislation that will make it possible to meet the nation's energy needs and reasonable environmental goals at the same time. More coal is needed now to avert steel shortages. Why cut coal production by unreasonable restrictions on surface mining at a time when all other energy sources—except coal—are in critical supply?

Bethlehem BETHLEHEM STEEL

How to be a WORLD TRAVELER that other travelers envy

There are two kinds of travelers in this world: those that plod around, guidebooks-in-hand to the regular run of tourist restaurants, hotels, resorts, beaches, etc.; and then there are those who always seem to know about things that are never in the guidebooks, who are always out ahead of everyone else, who seem to know about the newest art show, the newest play in London, that handsomely restored private villa, the opening of the racing season, the semi-private gardens, the little off-the-track inns and museums, new and attractive resorts and restaurants that most people have never even heard of, special concerts, lectures, and even an occasional reception before an opening.

These people obviously move in an entirely different travel world. How do they know about these things? Where do they get their information?

They read **Passport**, the privately published monthly newsletter for world travelers who travel a lot, who are intellectually curious, and who make a point of being up-to-the-minute on interesting things that are going on all over the world, whether it be in the area of public affairs, art, music, fashion, business, or sport.

They are not much concerned whether something is "in" or not, but rather that it is interesting and worthwhile. It could be a recently restored Palladian villa, a rare collection of Meissen or Sevres or Chinese Porcelain, a backstage lecture on an unusual opera, an attractive restaurant or ski resort — or just a pleasant quiet inn on a fishing stream in Ireland.

Passport is completely independent. It has no connection with any hotel or airline, and it's not supported by advertising, so it's very blunt about things. One of its most unusual features is that it warns readers about hotels, restaurants, and resorts that have become crowded, spoiled, and tip-hungry; airlines that always run late; cruise ships that are dirty and give grudging service; Greek island yachts that should be avoided at all costs.

Obviously, this brings many unfriendly letters from places it can't say anything good about, but it also brings loads of grateful letters from readers who have been spared travel disappointments — even disasters. A typical letter: "Can't thank you enough for warning us about that hotel we almost stayed at. Please renew our subscription at once."

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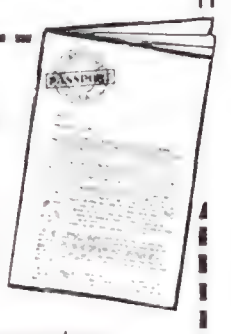

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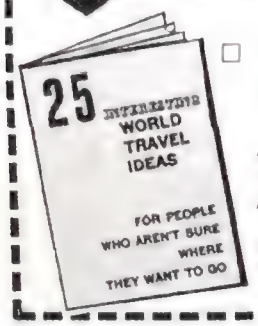

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ton. Food waste could also easily be recycled into livestock feed and organic fertilizer to supplement chemical fertilizer, which now sells at more than $120 a ton and is in short supply.
Henry Ritter jr.
Nashville, Tennessee

J. Paul Getty Museum

Dear Sir: David Shaw's article on the new J. Paul Getty Museum quotes from critics who do not appear to be familiar with Herculaneum or Roman architecture, including use of color, frescoes and marble.

The Getty museum is a splendid job of re-creating the authentic appearance and atmosphere of Herculaneum architecture, including the Villa dei Papyri. Short of the restored villa itself, one could hardly ask for more.
Joseph Jay Deiss
Wellfleet, Massachusetts

Dear Sir: David Shaw's description of Dr. Norman Neuerburg, consultant for the Getty museum, as "apoplectic" is one of the more undignified statements I've read recently.

Those of us who are art historians can only shake our heads at the unfortunate name-calling the so-called art critics of the *Los Angeles Times* like to do—and Shaw's quoting them.
Louise Harris Ivers
California State College
Dominguez Hills, California

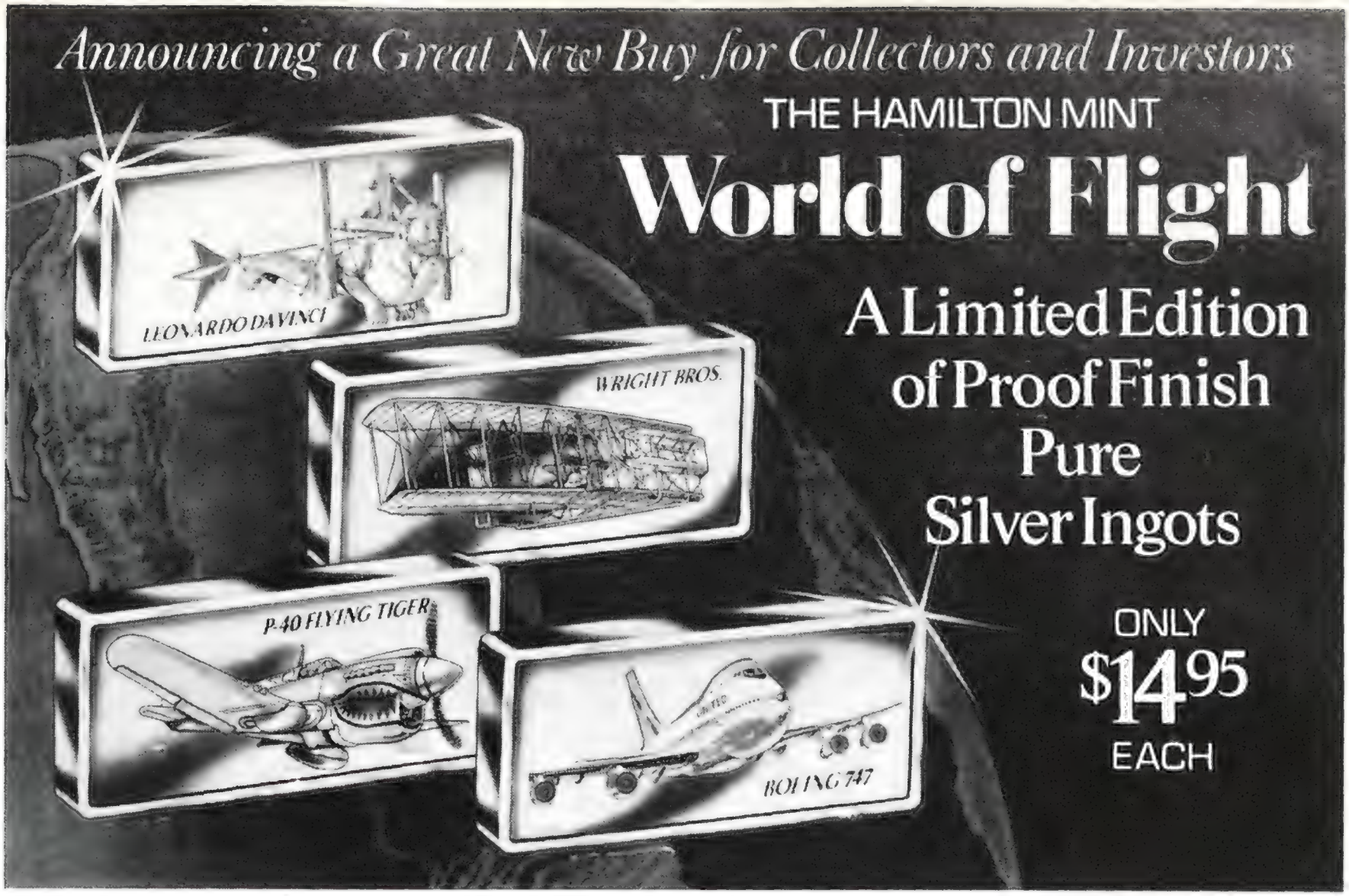
Aborigines

Dear Sir: As teachers of anthropology and their students know, the social organization of the Australian aborigines is incredibly complex; their ecological adaptation is superb; their moral and ethical code is worthy of emulation.

There is no justification for using the adjective "wild" in your caption to the photograph of the men drinking from a pool of rainwater.
Phillips Stevens jr.
State University of New York
Buffalo, New York

Phenomena, comment and notes

Dear Sir: You appear to take great delight in panning my 100-radial quadrant, 25-hour clock and the proposed improvements to our imperfect metric system.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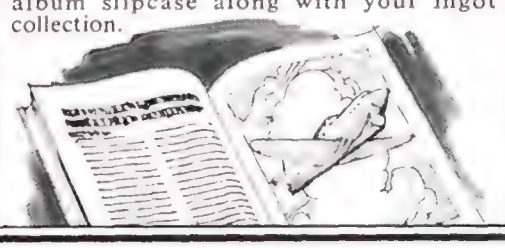

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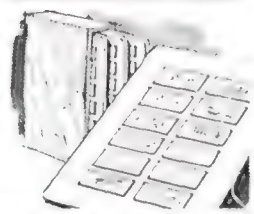

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Once those "unsuspecting schoolchildren" learn that *milli* means one one-thousandth and *kilo* means 1,000, they'll have the metric system down in 4/10 the time it takes to learn the fractions we now use for weights and measures. They are taught to count from 0 to 9, then to double up the digits and count from 10 to 100. But when it comes to teaching them to tell time, they are told to forget those numbers from 61 to 100. They must wonder what happened to the makers of the clocks.
E. Lewis Frasier
Media, Pennsylvania

Dear Sir: In the *Review of Medical Pharmacology*, Myers, Jawetz and Goldfien report that Indocin (trade name) produces frequent side effects and causes more toxic reactions than aspirin. Indocin can prove helpful in the treatment of some specific problems, but it may have played a role in the sudden death of several children and is now recommended for adults only.
June LoGuirato
Clifton, Virginia
The weak indomethacin lotion (not the pill Indocin) will not be available until exhaustive research proves it safe. Ed.

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How to talk Texian . . .

Dear Sir: As far as I know, there is no Southerners' Anti-Defamation League. But after reading H. Allen Smith's inane essay, "How to talk Texian . . . ," I'm tempted to form one.

I have never known a New Yorker "discouraged about my new vocabulary." They couldn't care less. And I couldn't care less about *their* "foreign language," which is "admittedly, not melodious," and requires "a certain plasticity of the epiglottis."
Michael DiPrima
Atlanta, Georgia

Dear Sir: When I was young, I worked with a girl from Amarillo, who once offered to go home with me to help alter a dress. On the way, she suddenly asked: "Have you pens?"

Puzzled, I replied that I had an ordinary fountain pen.

"No," she insisted, "I mean pens to pen up the him."
Marjorie P. Milner
Urbana, Illinois

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BOAC and BEA

200 years ago this month

Colonies choose members for their fateful congress

JULY 1774

On the fourth of July, Thomas Jefferson is home at Monticello, supervising the slow construction of his house, the design of his gardens. He walks among his brickmakers and notes that he will need 14 sash windows from Britain. He checks his new peach trees to see how much fruit is swelling on the branches despite that late frost of May. He also has time to mull over a piece of writing—an overall look at the problems of British America, why they occurred, how the rights of Americans have been violated, what, in fact, men's rights really are. In his mind he feels the words giving life to ideas that will hardly make joyful reading in King George's study.

On the fourth of July, George Washington writes to answer the complaint of young Bryan Fairfax that the Colonies are fast moving toward complete alienation from England. Should they not beseech the King for a redress of wrongs?

"I would heartily join you in . . . a humble and dutiful petition to the Throne," writes Washington, "provided there was the most distant hope of success. But have we not tried this already? Have we not addressed the Lords, and remonstrated to the Commons? And to what end? Did they deign to look at our petitions?" The colonel's fabled temper mounts; he grows warm under his white stock. "Do not the subsequent Bills (now I dare say Acts), for depriving the Massachusetts Bay of its Charter, and for transporting offenders into other colonies or to Great Britain for trial . . . convince us that the Administration is determined to stick at nothing to carry its point?"

Washington's eyes lift from the paper and seek the lush green of the riverbank lawns outside, silent in the heat except for the buzz of a drunken bee.

On the fourth of July, Benjamin Franklin in London is considering the first modest overtures of friendship that he has received from British statesmen since his ordeal before the Privy Council last January. Now Whig leaders, still anxious to repair the rift with America, are beginning to seek him out.

On the fourth of July, George III is mulling over the information he gleaned three days ago from Thomas Hutchinson, just arrived from his unhappy experience as governor of Massachusetts. In an exhausting interview, the King questioned his representative, gleaning every scrap of knowledge he could about Massachusetts in general and the current conditions in particular. He has learned a bit about Americans: "I see they threatened to pitch and feather you," he said. "*Tar* and feather, may it please your Majesty."

The king asked about the effect on Boston of Parliament's punishments, and the governor answered carefully, tiptoeing between the unpleasant truth that Boston is more rebellious than ever and the words George wants to hear. Hutchinson feels he has explained that the Port Bill and the Coercive Acts are stirring a frenzy of anti-British sentiment. The king today has a pleasant feeling that the Colonists will see the error of their ways and soon give up their delusions and come back to Mother England. He is really more interested in the progress of Queen Charlotte's latest pregnancy.

The Americans, meanwhile, are busily selecting delegates for the September congress in Philadelphia. Rhode Island and Massachusetts Bay have picked their men; Connecticut produces its slate on the 13th: Eliphalet Dyer, an ex-soldier more recently involved with a scheme to colonize the Susquehanna Valley; Silas Deane, a merchant and lawyer; a few others to back up if there are dropouts. New Hampshire chooses lawyer John Sullivan and Indian fighter Nathaniel Folsom. Maryland has four lawyers—Thomas Johnson jr., Robert Goldsborough, William Paca and Samuel Chase—and a big landowner, Matthew Tilghman.

Northern delegates are strong on the law; those chosen farther south reflect the agricultural thrust of those Colonies. New Jersey selects James Kinsey, William Livingston, John Dehart and Richard Smith, all lawyers, and Stephen Crane, not much of anything right now, but who once served as a sheriff. South Carolina, on the other hand, produces only two lawyers, John and Edward Rutledge, and three rich landowners, Christopher Gadsden, Thomas Lynch and Henry Middleton, who is said to own 800 slaves.

In New York and Pennsylvania the choosing of delegates turns into a political knife fight between moderates and patriots. New York maintains a "Committee of 51" which has proved itself too cautious for the Liberty Boys and their ilk. These patriots try to get a slate of delegates approved in time for the news to make the packet for England, but the

committee denounces and disavows the patriot meeting. Then, when the committee calls its public meeting, the patriots arrive en masse and take over.

At last, on July 28, the original five delegates are elected: three merchants—Philip Livingston, brother of New Jersey's delegate, John Alsop, Isaac Low and two lawyers, James Duane and John Jay.

Pennsylvania has been struggling since early June when Governor Penn refused to convene an assembly as the patriot John Dickinson wished. Dickinson is opposed by a strong and able moderate, Joseph Galloway, and the ideological battle rages. Groups are meeting: the ubiquitous "mechanics" (a generic name for most artisans) read letters from their New York counterparts. The Committee of Correspondence meets. The tradesmen meet. The county deputies meet.

On the 18th, because Lord Dunmore's War is still sputtering in the western hills and so gives him an excuse, Governor John Penn (grandson of the founder) convenes the Assembly. John Dickinson has been improving his spare time by writing a set of Instructions for the delegates—when they are chosen—in which he defines colonial status as free dominions, beyond Parliament's authority except in matters of external trade. As a sop to London, he suggests paying up for that troublesome Boston tea.

On July 22, the Pennsylvania Assembly chooses its delegates: Joseph Galloway, George Ross and Edward Biddle, all lawyers; Samuel Rhoads, a carpenter; John Morton, a surveyor; Charles Humphreys, a miller, and Thomas Mifflin, just plain rich. It's the only slate picked by a regular Colonial assembly. It is conservative. It ignores Dickinson's tract.

July's heat stifles the meeting halls, and sweating gentlemen fan themselves as they debate and slap away the fat flies. In Virginia, a young sea captain marks his 27th birthday and in a lowland Scots accent curses his luck at being cooped up ashore. It seems he slew a mutinous seaman in Tobago last year and feels he should remain incognito until the nasty business blows over. He wonders when he can get back to the cool, bright sea. His name is John Paul, but now he calls himself Jones as a precaution.

EDWARDS PARK

Next month: From blistering politics to the elegant world of art.

THIS PICTURE from 1953 reminds us that some things have changed in Jack Daniel's Hollow. And some things haven't.

Today our grain comes in trucks instead of mule-drawn wagons. But our miller inspects each load as heedfully as ever. And rejects it all if it's not up to standard. Another thing we still do is gentle our whiskey with charcoal mellowing. That's the process that accounts for Jack Daniel's unique smoothness. And even though it dates back to 1866, we're not about to change one part of it.

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DROP
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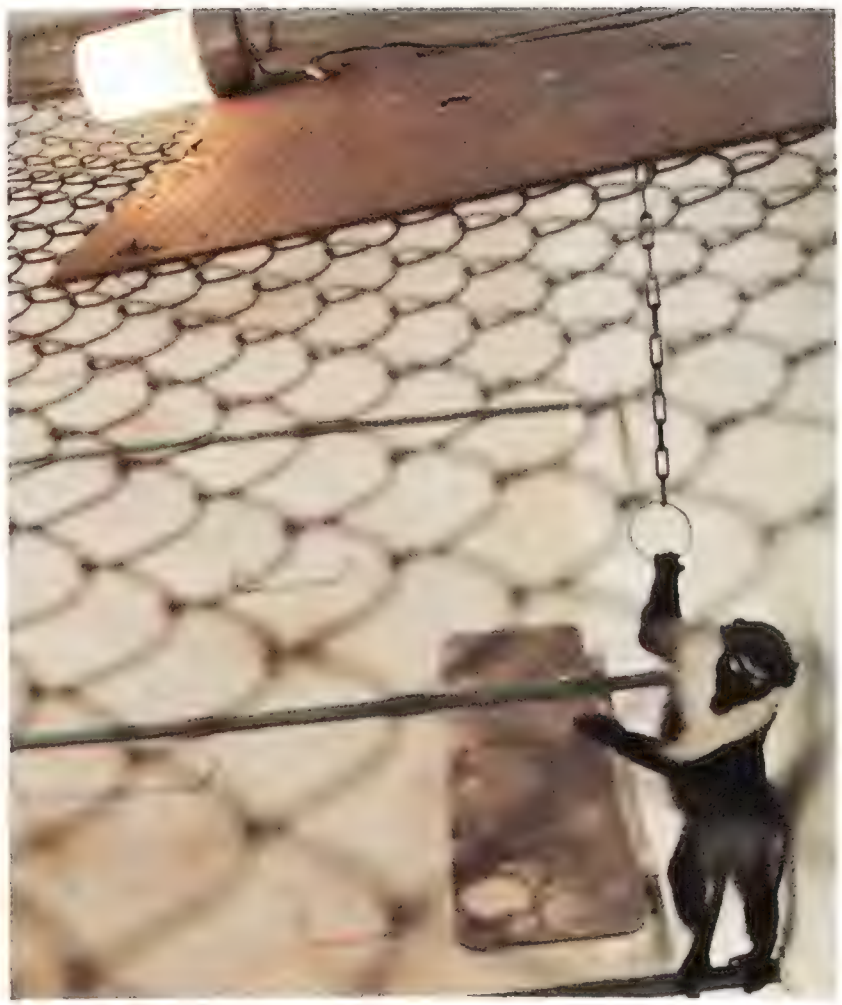
By Daniel Jack Chasan
Photographs by Ralph Morse

In this zoo, visitors learn, though no more than animals

Primates are quicker students than anyone expected in Portland, Oregon—but then so are the camels, ostriches, elephants and giraffes



The sequence begins when a light at top of the cage goes on and the monkey pulls a chain.

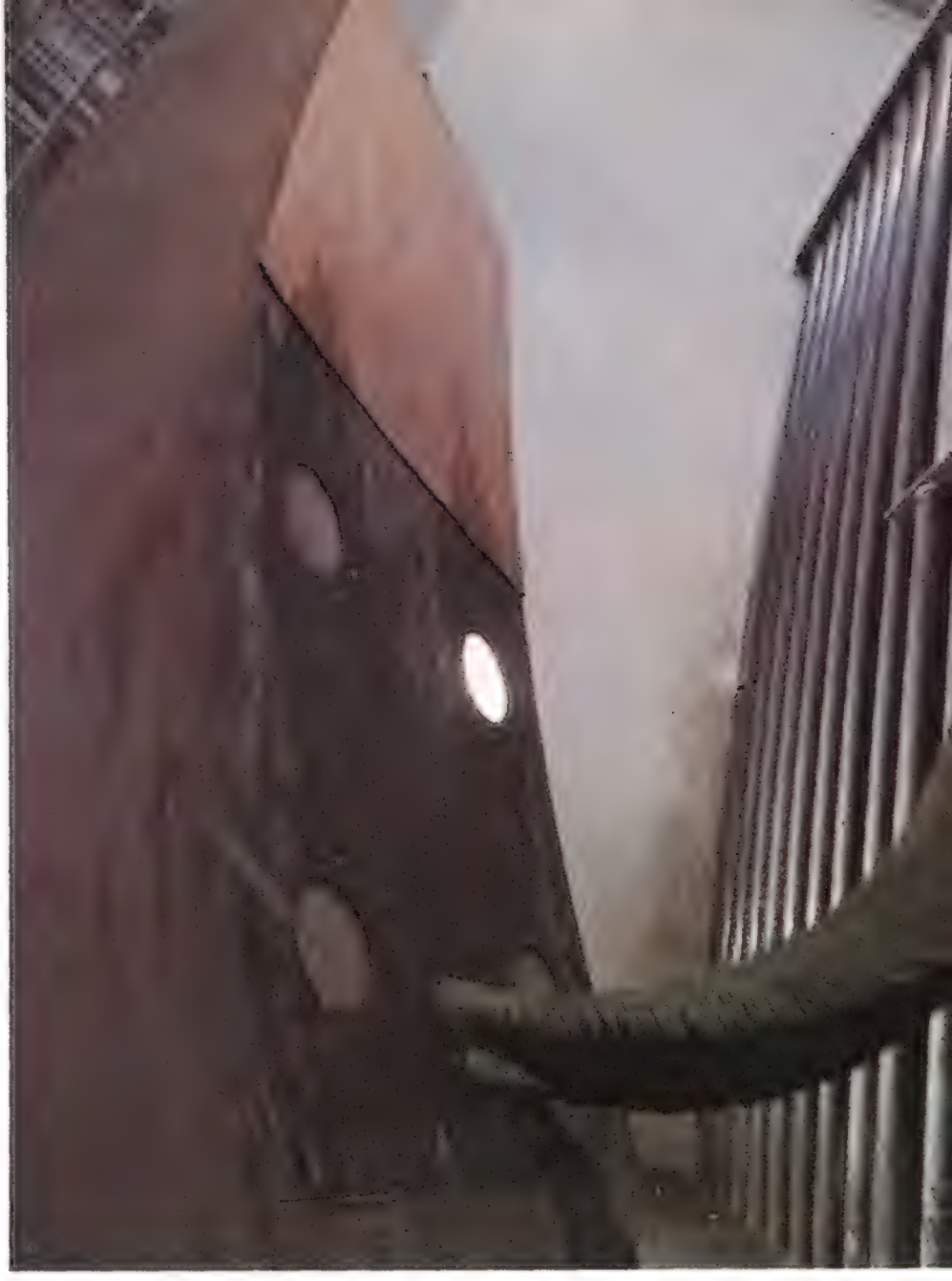
A light flashes on, high against the back wall of the 30-foot cage, and a young diana monkey—a small, elegant creature with black fur and a white beard—climbs a network of steel exercise bars to reach it. The monkey pulls a chain beside the light, and another light flashes on at the right end of the cage. A female monkey, the mother of the young one, pulls a chain beside that light, and receives a blue token, like a large plastic poker chip, from a slot in the wall. She reaches out and drops the token ten feet to the concrete floor. The little monkey climbs down, picks up the token and carries it to the lower left-hand corner of the wall where there are two openings. He drops the token into one opening, and two pieces of apple emerge from the other. Before he can take the apple, though, his mother—who has never learned to put the token into the slot—comes over and grabs most of it away from him.

A man holding a small child in his arms is standing in a crowd of zoo visitors watching the monkeys. The child, restless, begins to cry and fuss. "Be quiet," the man snaps. "I want to see this."

Someone puts a dime in a coin slot in front of the cage. The first light flashes on again. Again, the little monkey climbs up and pulls the chain. Again, his mother collects the token and drops it on the floor.

A diana monkey pulls chain after a light goes on, one step toward receiving a reward.

After pulling second chain (left), the monkey receives a token he can then put into a slot to obtain food.



This time, though, when the little monkey picks it up, he saunters around the cage with it, pretending the vending machine in the corner is the farthest thing from his mind. He walks slowly along a long bar at right angles to the wall. He sits on a short bar beside his sibling. He does everything but whistle. Finally, he makes his move toward the slot. This time, his mother stays by the second light, and his sibling tries to rip off the pieces of apple.

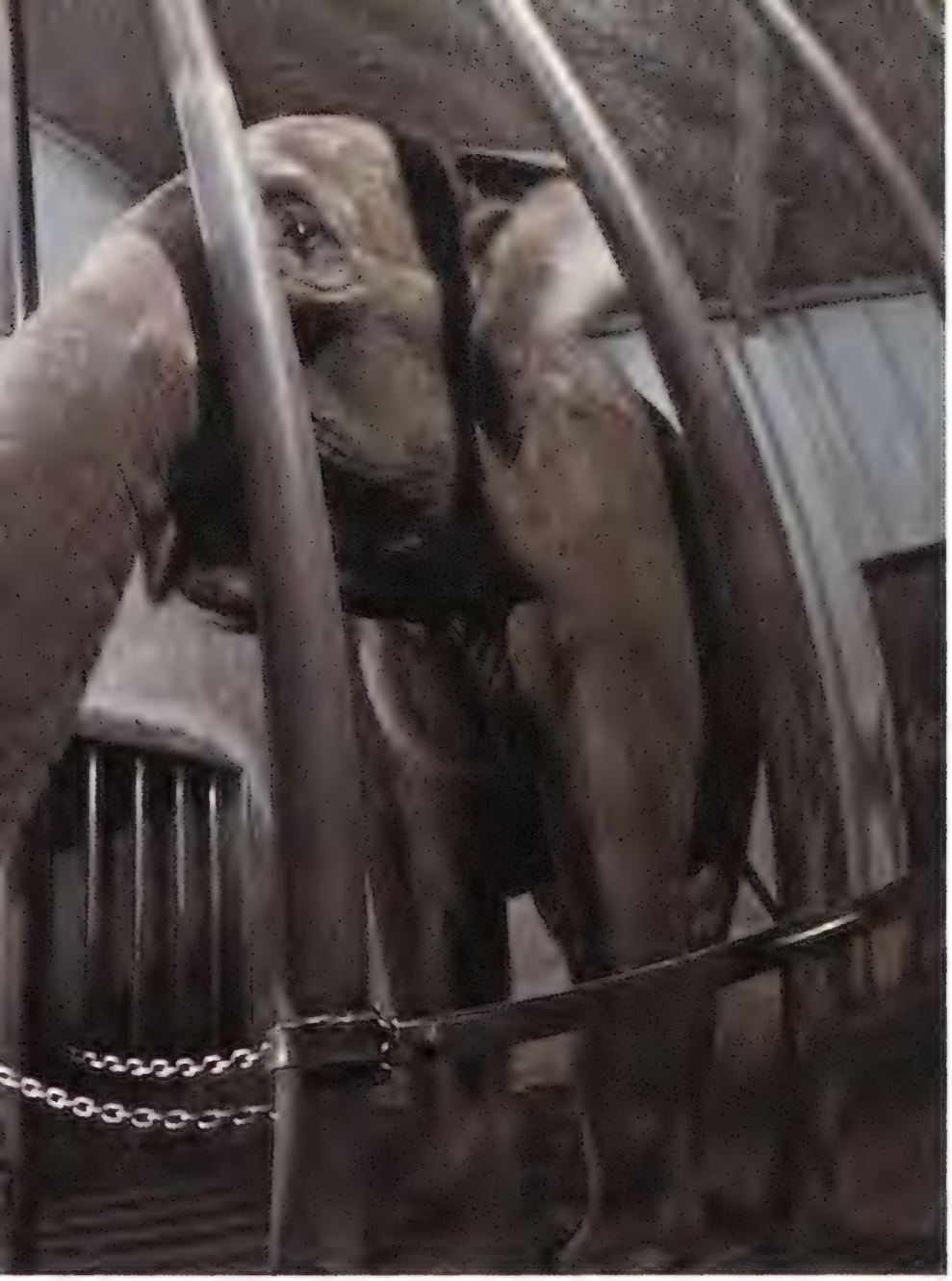
The diana monkeys' initiation into the world of specie payment, coin vending machines and deferred rewards is only one part—although admittedly a spectacular one—of a unique research program that has been going on at the zoo in Portland, Oregon, since 1972. The Portland Zoological Gardens consist of a modest collection of drab concrete buildings amid Douglas firs in the hilly outskirts of the city. It is not a large zoo, and it is hovering on the brink of insolvency; even now, it depends on the labor of young volunteers. Yet its research program is one of the most striking recent innovations in the world of zoos.

In addition to the diana monkeys, the cast of characters includes gibbons that have also learned to pull levers when lights come on, chimps that are learning the standard American Sign Language for the deaf and mute, and an assortment of seals, ostriches, giraffes, camels and elephants that have learned to press lighted panels with their noses, beaks, chins and trunks, all in exchange for food. The animals all get fed every day whether or not they choose to cooperate with the experiments. But evidently not even animals live by bread alone: They virtually always do cooperate without any twisting of arms, legs or flippers. In fact, when the gibbons' apparatus was shut off so that the zoo could equip it with solid-state circuits, gibbons holding food in their hands would climb up and pull the useless chains, trying to get a little action. In the near future, they may be joined by orangutans that play ticktacktoe against human opponents, and by servals—small, spotted African cats capable of catching birds on the wing—that leap for fast-moving targets whizzing by on overhead tracks.

The human beings who set these processes up want to see how fast the various animals can learn them, how fast the animals can learn to make "reversals" (for example, hit an unlighted panel instead of a lighted one), and how the processes affect social interactions among the animals involved. They also want to give the animals some task—preferably something similar to what they would do in the wild—to counteract the boredom of a traditional zoo existence.

Zoo directors in other cities tend to think all this will be good for both the animals and the public, but the feelings of Portland's citizens have been decidedly mixed. Not that anyone objects to seeing the animals at work. But "operant conditioning" and the other professional jargon used to describe what is going on fills some people with discomfiting visions of 1984.

Daniel Jack Chasan has written for SMITHSONIAN *on heart surgery, left- and right-handedness, rapid transit, accelerators and lake reclamation.*



A giraffe wraps its tongue around a carrot held by Philip Ogilvie, innovative director of the zoo.

This elephant had no trouble winning edible prizes from a game board it had not seen in eight years.

And some people, amazingly, seem offended by the very idea of a zoo engaging in research. At least one local politician has been known to argue that the public supports the zoo and the public should be entertained by it, period.

The idea of a zoo as pure entertainment receives short shrift from Portland's director, a tall, assertive man with graying muttonchop whiskers and an extracurricular interest in fine wines, named Philip Ogilvie. Ogilvie, who began his career as an academic biologist specializing in chameleons, came to Portland three years ago after directing a zoo in Oklahoma City and designing the (soon to be built) Minnesota Zoological Garden. "Behavioral engineering"—in this case teaching the various creatures to do something in exchange for their food—is at the core of his program in Portland. And he has pushed hard to establish it. "We'd like to set up something like that, too, if we had the money," a progressive zoo director in another city said recently. Then he thought a moment and conceded, "Hell, Phil didn't have the money, either. He just scraped it together from here and there."

Simply amusing the populace might have been easier but, Ogilvie says, public entertainment "doesn't justify taking animals out of the wild." Asked if anything really does justify taking animals out of the wild, he laughs. "I wonder about that," he says. "Sometimes I'm not sure anything does. *If* anything does, it's interpreting their behavior to the public."

Since the rise of the environmental movement, many younger zoo directors have drawn a sense of purpose from the idea that they can make people aware of the interrelatedness of all living things, and the importance of preserving animal life not directly useful to human beings. Ogilvie is basically of this school. But he quickly points out that, unlike many latter-day environmentalists, he was teaching ecology as a college subject years before it became a topic of general concern or a rationale for the operation of zoos. And he is skeptical of the idea of zoos as breeding places for animal species that have become endangered in the wild. He says, succinctly, that "Preserving a small group of animals while their habitat is destroyed is nonsense. If the habitat goes, that's it." He does hope, though, that by demonstrating that an animal doesn't exist in a vacuum, the Portland exhibits will help persuade people that habitats should be preserved.

Whatever the Portland exhibits teach or fail to teach the zoo-going public, both Ogilvie and Hal Markowitz, his research director, are dead certain that

they make life much more interesting for the animals involved. Both men are convinced that subjecting an intelligent animal to traditional zoo life—spending most of its hours on a concrete cage floor onto which its food arrives with a splat once a day—verges on sadism. "If you set out to design an environment of total sensory deprivation," Ogilvie says, "you couldn't do much better than a traditional zoo cage." That seemed obvious to Ogilvie when he first became a zoo director in 1965 (after reading in a newspaper that the Oklahoma City Zoo had an opening), and it seemed obvious to Markowitz when the Zoological Society appointed him as the Portland zoo's director of research in 1972. (Markowitz, a specialist in brain chemistry and function, had been chairman of the psychology department at nearby Pacific University.)

When Markowitz arrived at the zoo, he first turned his attention to the gibbons because, he has written, for gibbons the "routine feeding procedure seemed especially grotesque. Watching tree-dwelling animals sit on the cement and awkwardly pick at piles of food took much of the joy out of visits to these handsome apes." His idea was to give the gibbons something to do that would involve as much swinging by their hands as possible, and would do it within the confines of their existing 30-foot cage. There were two openings with ledges already built into the back of the cage, high up on the wall, so Markowitz designed a system in which lights and levers were installed at both openings. If a visitor drops a coin into a box outside the cage, the light at the left flashes on. (If no one puts in a coin, a clock will operate the light after a while anyway.) When a gibbon pulls the lever beside that light, the light at the right end of the cage flashes on. When a gibbon pulls the lever beside that one, a piece of food emerges from a slot in the wall.

Harvey catches on fast

A young male known as Harvey Wallbanger quickly established himself as the main puller of the first lever, and at first found himself being exploited by his cage mates, who would simply sit by the food slot, waiting to pull the second lever and help themselves as soon as he pulled the first. Harvey caught on fast, though, and although he doesn't object to feeding his old mother, he now will operate the first lever only if his brother stands far enough away from the food slot to give Harvey a fair chance of beating him to the second.

Markowitz' most elaborate experiments have all involved primates, but nonprimates have got something close to equal time. Markowitz and his associates have, after all, "done" elephants and seals. They have done ostriches and giraffes. They have done camels. Camels?

"No one has ever done research with camels before," Markowitz explains. "Besides, I *like* camels." The camels' apparatus consists of a microswitch and a food slot, designed so that if a camel hits the switch the requisite number of times, it gets food through the slot. The idea was to see how many times the camel would be willing to hit the switch with its nose to get a single reward. At what point would the animal decide that the reward wasn't worth the effort? The trouble was, the camel didn't use its nose; contrary to all expectations, it walked up to the machine, put its chin against the switch, and began vibrating its chin so rapidly that it quickly hit the switch dozens of times with virtually no effort. Vic Stevens, the designer, had expected the camel to give out while the repetitions were still in double figures. Instead, it began to show substantial strain only when it hit 150. The experiment is still going on, but now it is organized somewhat more on the camel's terms.

A chimpanzee learning the hand language for the deaf tries the sign for "eating," with a reward in sight.

The elephants also have proved to be remarkable subjects. A Reed College psychology professor named Les Squier had taught the zoo's elephants to press lighted panels with their trunks in exchange for food in 1965. Squier had quickly abandoned the project, though, and the elephants hadn't even seen the apparatus again until zoo employees found it on a scrap heap in 1973. They fixed it up and wheeled it into the elephant house, where, to everyone's astonishment, a Vietnamese elephant named Tuy Hoa began working it as if she had been practicing all along. It seems an elephant really doesn't forget. Tuy Hoa's cage mates, Rosy and Belle, had a lot of trouble with the apparatus, but medical examinations later showed that it was

their eyesight, not their memories, that had dimmed.

If it is tempting to anthropomorphize with the elephants or dianas, it is absolutely unavoidable with the chimps, who are, after all, being taught a human language (albeit one of signs or gestures rather than vocables). The chimps are being educated by a group of volunteers headed by Katheryne Johnson, a dark-haired young woman whose manner conveys both energy and calm—qualities which are evidently much needed when working with chimpanzees. She sits very

Schoolchildren and a chimpanzee begin to share a vocabulary when they agree on the sign for "hat."

still while they run and wrestle around her, but when they're on her lap and ready to work, she is busy every second, talking to them, showing them signs, guiding their hands into the proper positions, rewarding them with drinks of juice and pieces of fruit. Her efforts have paid off: Two young chimps named Charlie and Jezebel have each mastered more than two dozen words, and are quite capable of asking to be fed, tickled or picked up, or referring to apples, oranges or bananas by sign name. Not long ago, the chimps were first seen talking to each other in sign language. Katheryne Johnson had been playing a chase game with Charlie. After a while she got tired and stopped. Charlie made the sign for "chase" to Jezebel, and she took off with him after her in hot pursuit.

The people who work with chimps are clearly crazy about the animals, and more interested in the chimps' own linguistic progress than in the possibility of their communicating with the public at large. For Ogilvie, even the chimps' linguistic progress isn't the most important thing. He explains that teaching the chimps sign language is only a part, and not an indispensable one, of an effort to find out if an "enriched" environment does them any observable good. He wants eventually to have observations made of Portland's chimps, a group of chimps from a traditional zoo, a group of chimps from a circus or carnival ("who receive a lot of *negative* reinforcement" in the course of their training) and a group of wild chimps. The point will be to see which of the first three groups behaves most like the wild chimps, who presumably qualify as a desirable norm. Ogilvie says he expects both the Portland chimps and the circus chimps to behave more like their wild relatives than the traditional zoo chimps do, but expects little difference between the two. "I suspect," he says, "that, in terms of chimp behavior, it doesn't matter whether the reinforcement is positive or negative; the important thing is interaction."

People have tried "enriching" chimps' environments before, and have even taught them the American Sign Language—Beatrice T. and R. Allen Gardner,

Confronted with a color wheel, a chimp expresses his cooperation by indicating that he sees it.

in Reno, Nevada, have been teaching ASL to a chimp named Washoe since 1966, and William B. Lemmon, in Norman, Oklahoma (an old friend and colleague of Ogilvie), has been teaching ASL to chimps, too—but no one has ever done it in a zoo before.

Ogilvie and Markowitz have been surprised by how quickly the animals learn. Markowitz says that everyone has overestimated the time it would take for virtually all the animals to master their equipment. Even the ostriches—big, surly birds that the keepers give a wide berth to and that no one has ever credited with much intelligence—have learned to peck a single key faster than anyone expected. The whole ostrich colony now looks quite expert as it stands in front of its apparatus, each bird in turn pecking open-beaked with a movement of its long, snaky neck, then reaching down for its reward. The birds were so fond of peanuts, their original reward, and so adept at getting them that they ate virtually nothing else and singlehandedly unbalanced their own diets.

What is the scientific significance of doing this or any other kind of behavioral research in a zoo? Markowitz explains that laboratory animals are virtually always studied in isolation, which is most unnatural for the animals and which "may be a great distortion." In the zoo, a researcher can—in fact, a researcher pretty well must—study animals in a social context, surrounded by their peers. This does not make for neat experiments, but it may make for valuable results.

The researcher may also get a chance to function in a social context, himself. A case in point is a recent visit by Markowitz to the diana monkeys' cage. As Markowitz walks up to the cage, a young woman in a green jacket, accompanied by her husband and a horde of small children, is jumping up and down in front of the glass. The top light is shining in the cage, and the female monkey is sitting near it. As the woman jumps, her dark hair swinging behind her, she yells to the monkey, "Pull it. Pull it. Pull the chain." Then she turns to Markowitz, who is standing there in a white lab coat, and complains, "He won't pull it."

"*She* never does," Markowitz tells her with quiet authority. Perversely, the monkey pulls the chain. The male diana pulls the second chain and gets the token. He climbs down to the food slot, where he rummages around like a kid hoping to find something in a coin return. He doesn't insert the token. Since the monkeys have already obtained food 84 times that day, it's not hard to see why he doesn't.

But the woman in the green jacket isn't sympathetic. She tries to move the monkey toward the slot with body English. She jumps up and down again. "Put it in the slot," she yells. *"Put it in the slot, you dummy!"*

Markowitz' experiment has obviously struck a responsive chord. He smiles. "Well," he says, "this is the most reinforcement *I've* gotten in months."

When the light goes on, ostriches peck at a switch for a reward. For the unusual view opposite, the photographer lay on a ledge over them, as above.

The fanciful spire atop Notre-Dame de Paris was designed by Viollet-le-Duc, who retained proportions of the original 13th-century spire, demolished in 1792. Pelicanlike gargoyle in foreground is also his.

By Bern Keating

Viollet-le-Duc re-created France's medieval legacy

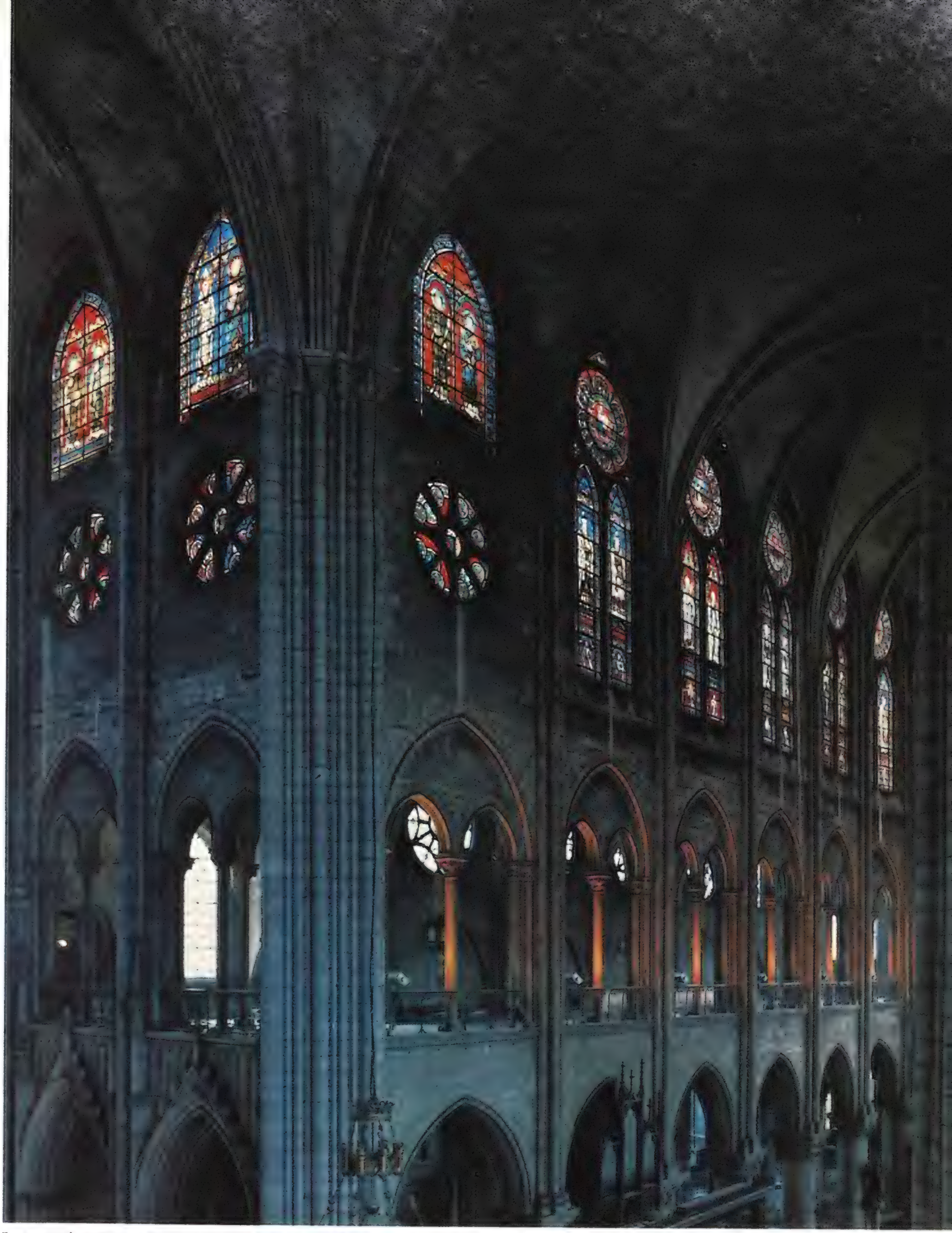
The controversial 19th-century restorer salvaged (ruined, some say) churches and monuments throughout the country

Eugène Viollet-le-Duc, the great architectural restorer, is reviled by a number of Frenchmen as a vandal who disfigured their most precious architectural relics. Born in Paris in 1814, he was from the age of 26 until his death in 1879 the principal restorer—even, in many cases, the outright savior—of France's medieval monuments. He helped preserve almost every major cathedral in France. Occasionally he displayed excessive zeal, altering buildings to such an extent that our own view of the Middle Ages is virtually filtered through his 19th-century vision of how medieval architecture *should* have looked. At Notre-Dame de Paris, for instance, he designed both the neo-Gothic spire (left) and several stained-glass windows (opposite).

Recently I tried to compare the changed aspect of Notre-Dame de Paris with its prerestoration look. I was leaning on a bridge over the Seine scrutinizing a drawing of the rear elevation made by Viollet-le-Duc himself before his rescue work began in 1845. A very model of the upper-bourgeois matron glanced over my shoulder, recognized the sketch, and overcame her natural reserve to launch a tirade against the cathedral's alterations and their author.

"Look at that foolish spire," she said. "It is a typical *Viollet-le-Duquerie* for him to add his perverted trickeries where none existed before."

Bern Keating, a free-lance writer and habitué of Paris, wrote the article on Atlanta's Center for Disease Control in SMITHSONIAN *(February 1973).*



In restoring Notre-Dame's stained-glass windows, Viollet-le-Duc installed 12th-century-type roses (in the three bays on left), which he believed more "correct" than 13th-century windows (right).

Color photographs by Dmitri Kessel

This is how Viollet-le-Duc appeared about 1860, some 20 years after taking on his first restoration job.

From experience, I knew it was useless to point out that the spire is a superb technical achievement and adds an essential grace that, with the tracery of flying buttresses around the apsidal walls, makes the great mass look light enough to take off and hover between heaven and earth. Moreover, the cathedral did indeed have a spire until 1792, when it was demolished because it had begun to lean and threatened to collapse. So also with the famed gargoyles, deplored by the indignant matron—they are, indeed, the conceptions of Viollet-le-Duc, but they are monstrosities splendid of their kind and they replace historical gargoyles that were removed during the 18th century, supposedly because they might fall and injure worshipers.

Useless to protest, for the woman had been too well schooled in the admirable but rigid French academic system, which gives few merit badges for any departure from accepted wisdom and standards of taste.

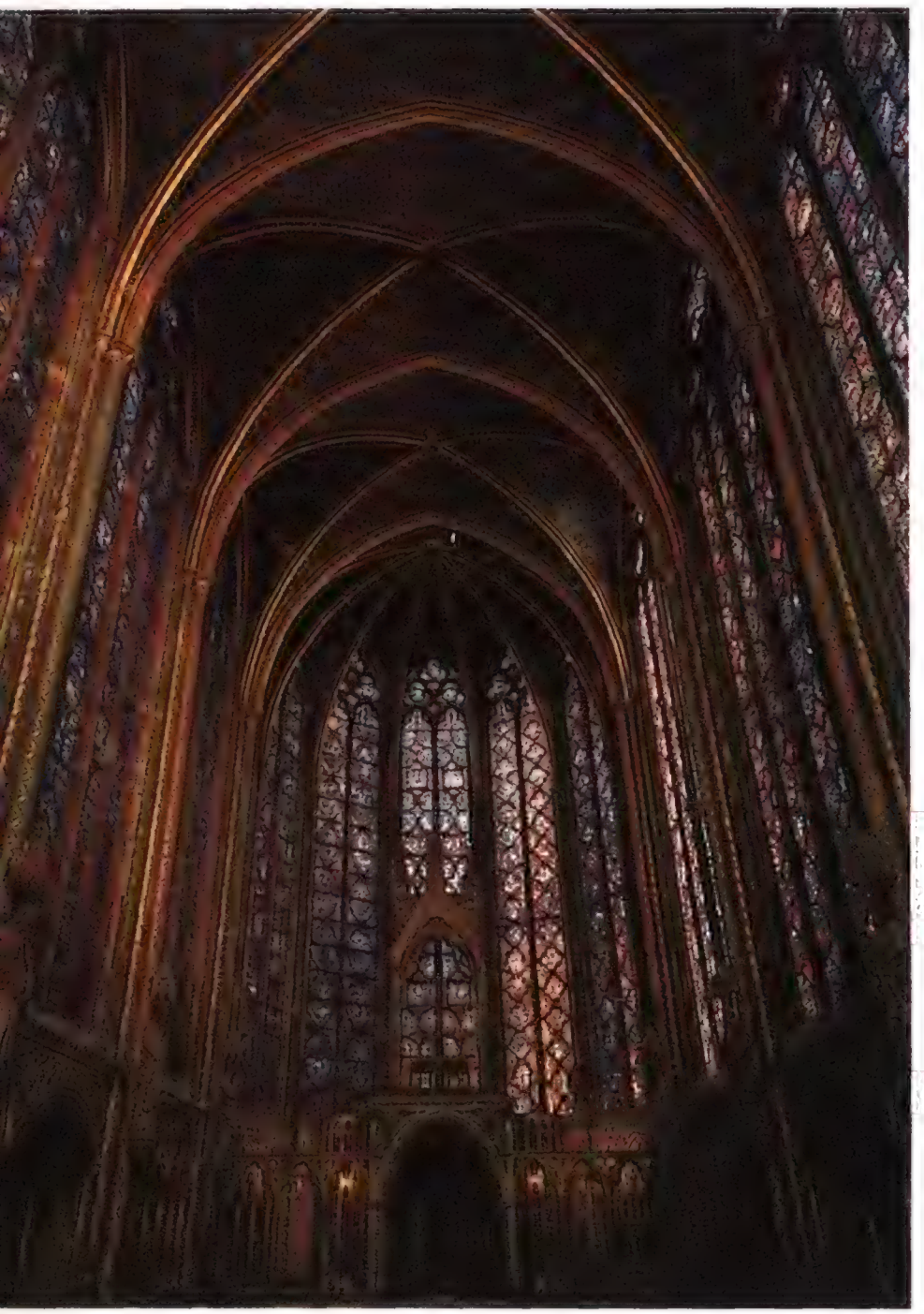
The much-abused architect was born into a family of high-ranking builders, designers, civil servants and architects. His father became keeper of the royal residences for King Louis-Philippe. That intimacy with the mighty can be traced through the curious family name, as strange-appearing in French as in English. A grandfather, Nicolas Viollet, in 1740 married a girl who, in the delicate French expression, "had tender ties" with the Duke of Montmorency-Luxembourg. Apparently dazzled by his wife's social standing, Nicolas, son of a hay merchant, added a proud "-le-Duc" to his name and it stuck.

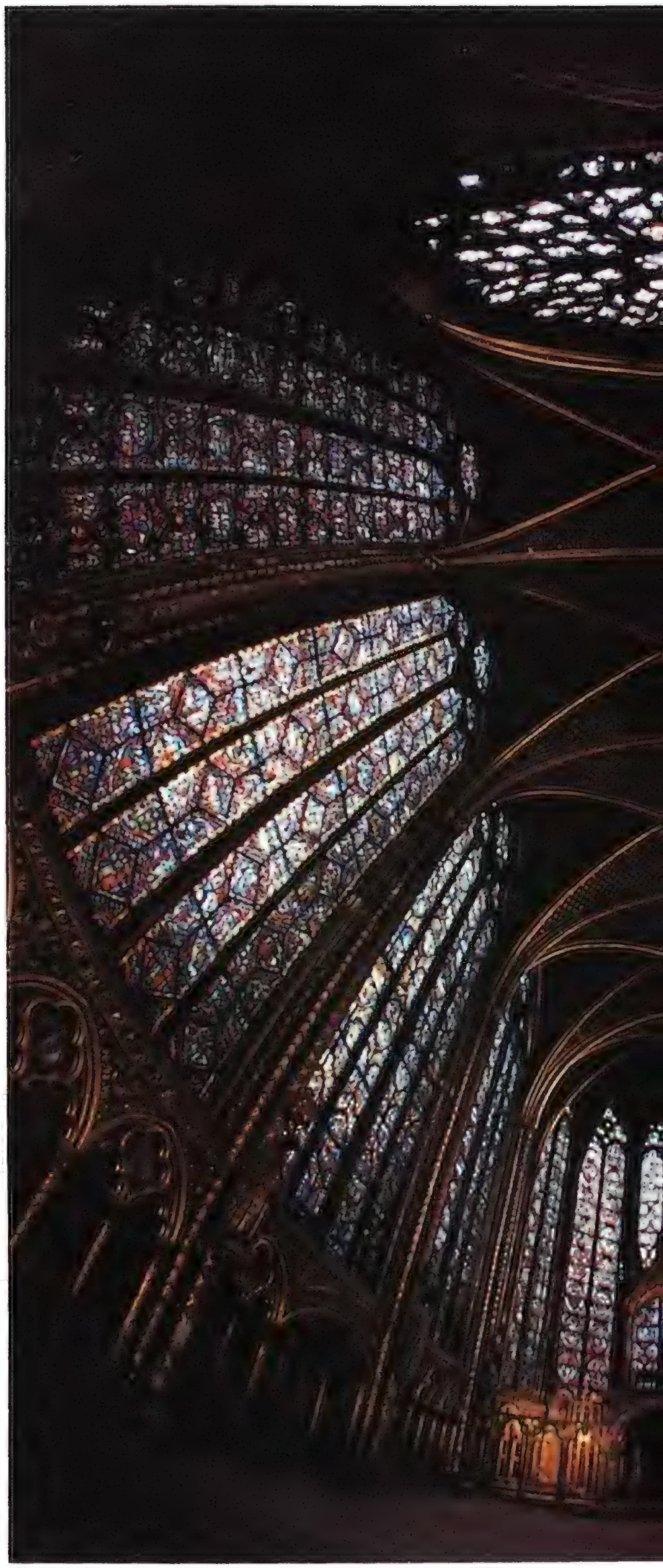
The young Eugène grew up in a household where his mother held a brilliant salon on the second floor for France's intellectuals, including Stendhal and Sainte-Beuve. More important to the youth's development, however, was the bachelor salon on the sixth floor, presided over by his mother's brother Etienne Delécluze, who was a painter, novelist and art critic. His equally brilliant assemblage included not only Stendhal but also Prosper Mérimée, author of *Carmen,* who was destined to become Eugène's powerful patron.

When Delécluze eventually fled city life, his sister entrusted him with the education of her two sons, including Eugène, in the village of Fontenay-aux-Roses.

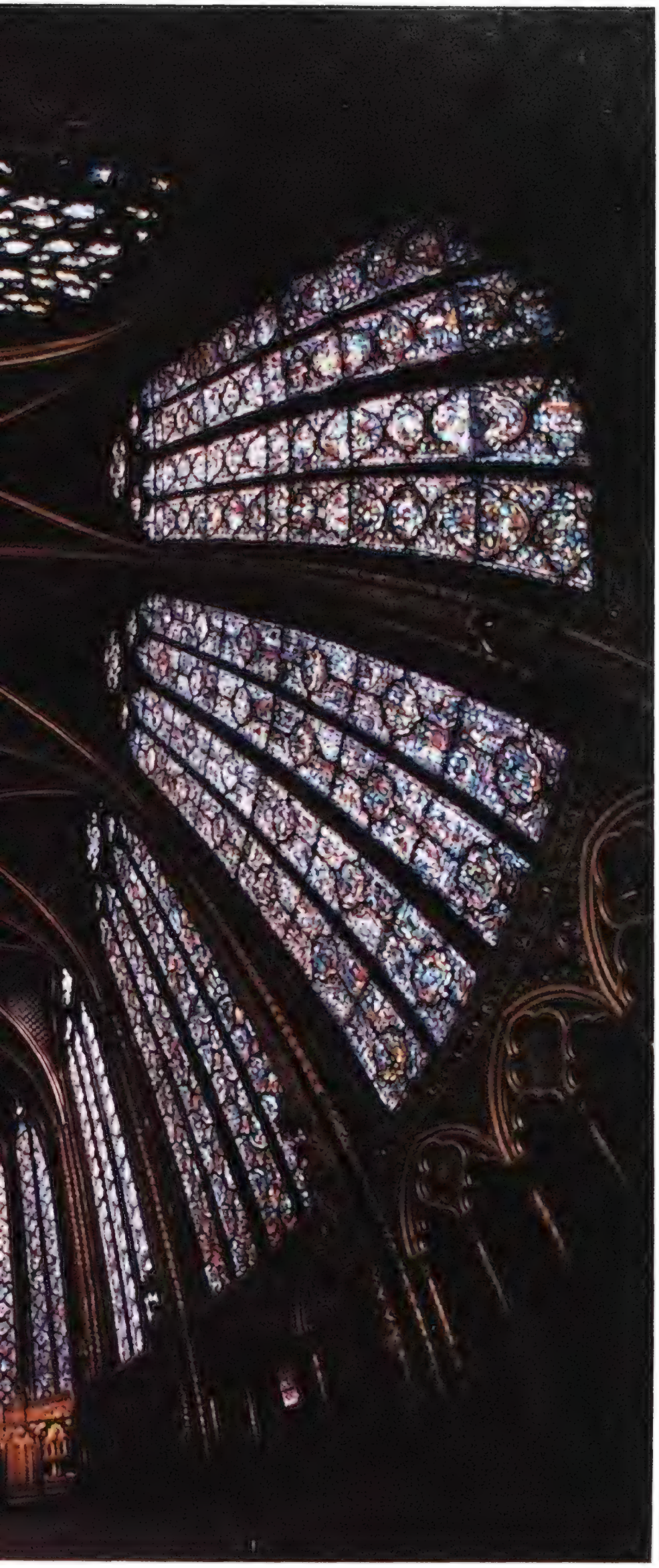
At Vézelay, Viollet-le-Duc reinforced the walls of the basilica and constructed a new vaulted ceiling.

Vézelay's pillar-figures are 12th-century originals, but tympanum over main portal is by Viollet-le-Duc.





About one-third of the stained-glass windows in the Sainte-Chapelle (above and, through fish-eye lens, at right) were remade in mid-19th century. Viollet-le-Duc and his colleague Lassus assisted in the restoration.



An ardent liberal, Delécluze put the boys in a school run by a rabid anticlerical republican. Acquiring a lifelong disdain for clerics and institutions, Eugène helped build barricades for the Revolution of 1830.

More significant for his career, this antiestablishment bias made him reject a chance to study at the Ecole des Beaux-Arts.

"The school is a mold for architects; they come out of there virtually identical," he wrote. "The student who enters the Ecole des Beaux-Arts is like those unfortunates who get the end of a finger caught in the gears of a powerful machine; he is pulled all the way through; he emerges as a fabricated object."

Instead of getting a formal schooling, he spent 17 months rambling through Italy, making hundreds of sketches. In Sicily he studied the Norman and Arabic buildings that had an influence on Gothic architecture (which stimulated his interest in the Gothic style), and in the Po Valley he cast a cold eye on Palladian architecture (which helped inspire his lifelong distaste for neoclassical and Renaissance design). Though he wrote home from Pisa deploring the Italian version of Gothic, he there became fascinated with a style in which he saw architectural logic rather than barbarous overdecoration.

Victor Hugo's hunchback helped out

His letters home in praise of Gothic arrived in Paris just at the close of a culture-wide and centuries-long love affair with Renaissance architecture, a period which had accepted the Italian coinage of "Gothic" as a word synonymous with barbarian. For at least two centuries, all of France had treated its architectural testimonials to medieval piety and building genius with a contempt that often became downright vandalism. (To permit passage of the high canopies carried in 18th-century religious processions, the neoclassical architect Soufflot chopped a hole through the irreplaceable Last Judgment on the tympanum over the main entrance of Notre-Dame de Paris.)

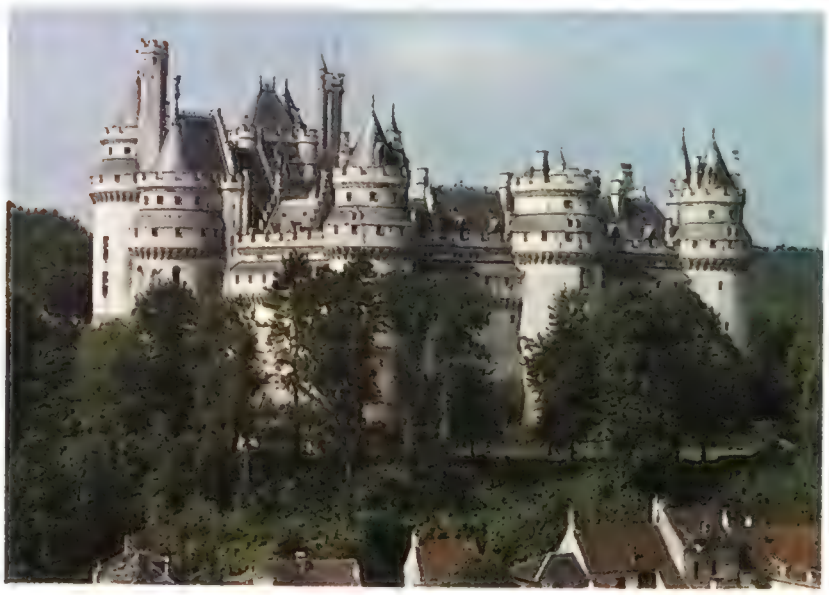
But the Age of Romanticism had dawned. The giant of early 19th-century French literature, Victor Hugo, began to thunder against the destruction of France's medieval monuments. In his *Hunchback of Notre Dame* he caught the popular imagination and inspired the government to consider salvaging what still existed of France's medieval heritage.

In 1834 Prosper Mérimée took over the newly created post of Inspector General of Historical Monuments. He immediately made a bone-grinding tour of France, taking notes on the condition of churches, abbeys, châteaux and fortified cities. Everywhere he found France's architectural treasures in ruins.

Most alarming of all was the great basilica of Vézelay

The not-so-medieval Great Hall of the château of Pierrefonds reflects opulence of Napoleon III.

As this 1855 photograph shows, Pierrefonds was in ruinous condition before Viollet-le-Duc restored it.



This photograph, taken from a slightly different angle, shows the château in all its present-day splendor.

The row of sculptured figures at far end represent Empress Eugénie and the ladies of her court.

in Burgundy, the once powerful abbey where St. Bernard of Clairvaux had launched the Second Crusade. Mérimée wrote: "The walls are buckled, cracked, rotted by humidity. . . . While I was drawing in the church, I heard continually little stones cracking loose and falling all about me."

So bad was Vézelay that the government's architects refused to touch it on the grounds it was not only hopelessly ruined, but dangerous for workmen. Casting about for a candidate to undertake the restoration, Mérimée thought of his 26-year-old friend and champion of France's medieval heritage, Viollet-le-Duc. In 1840 the young man blithely undertook the apparently hopeless restoration, the first of scores to come.

After he had reinforced the walls of the nave (p. 32) with flying buttresses, the central vault collapsed, carrying away all the scaffolding. A few months earlier the collapse of the vault would have brought down the whole building and Vézelay would have been lost to history. The architect had arrived, like the U.S. Cavalry in a Grade-B Western, just in the nick of time. He proceeded to order a new tympanum (p. 33), copied from the original, for the main entrance.

While working at Vézelay in 1843, Viollet-le-Duc learned that he and his partner, the architect J.B.A. Lassus, had won the contest to take over restoration of the cathedral of the nation's capital, Notre-Dame de Paris. The magnificent edifice, begun in 1163 by order of Louis VIII, had sunk into advanced decay. Revolutionary mobs had pulled down the statuary of the Gallery of Kings and smashed it on the paving, where the fragments lay for years. A coal dealer had gathered the statues of St. Stephen and the 12 Apostles as props for his bins. The neoclassical architects of the Ancien Régime had laid down incongruous checkerboard flooring and had whitewashed over Gothic ornament.

He perhaps overdid his reverence

Facing the complex problem of Notre-Dame, Viollet-le-Duc had mighty decisions to make. The church had not sprung whole and entire from the brain of a 12th-century Master Builder; it had grown with additions and modifications from every age, some felicitous, some calamitous. Which to retain and which suppress?

After the death in 1857 of his colleague Lassus, who had always exerted a restraining influence on Viollet-le-Duc's enthusiasms, the chief restorer drifted toward a return to the primitive 12th-century church. The 13th-century windows of the clerestory in several bays adjoining the transept, for instance, were torn out and replaced with smaller windows in the 12th-century style (p. 31). Though aided by small rose windows, the reconstruction in the manner of the 12th century further darkened an already gloomy interior. Even Pierre-Marie Auzas, Chief Inspector of Historical Monuments and defender of the great restorer's good name, told me Viollet-le-Duc perhaps overdid his reverence for the first builders in this alteration.

Most guidebooks, speaking of the southern rose window, dismiss it as a pastiche, apparently because it was entirely reconstructed in the 19th century by Viollet-le-Duc. Nowhere do they indicate that the southern rose window had nearly collapsed by 1730, and had been reworked so ineptly that it threatened to bring down the whole south wall.

You have only to stand for a single afternoon in the crossing of the nave and transept, where all three of the great roses are visible, and listen to the visitors to

discover that it is Viollet-le-Duc's creation that stuns the modern eye. I even heard a French-speaking guide praise the southern rose as a glory of the Middle Ages while deploring the more nearly original western rose.

During the years that Notre-Dame was being renovated, Viollet-le-Duc was also helping to restore the interior of Sainte-Chapelle (pp. 34, 35), a brilliant jewel of a Gothic chapel built by Louis IX to house the reputed Crown of Thorns. Invariably, Viollet-le-Duc's work is better received by foreigners than by Frenchmen, and Sainte-Chapelle is no exception. Talbot Hamlin, a professor of architecture at Columbia University, has said: "The greater part of the glass, much of the carving, and all of the color decoration, as we see it today, is of the 19th century—a restoration by Viollet-le-Duc—but its basic design and its controlling colors are right and can be accepted as showing us, if only imperfectly, the real glory of the Rayonnant Gothic ideal."

Elsewhere, restoration work progressed simultaneously on as many as 28 sites, including Chartres, Amiens, Reims, Troyes, Clermont-Ferrand, Sens, Toulouse, Narbonne and the Burgundian walled village of Semur-en-Auxois. For 25 years Viollet-le-Duc indefatigably crisscrossed the face of France, often writing home wry observations on the wretched backcountry food that he had to endure. He said that in the Auvergne "it is not the custom to serve hairs and soup in separate dishes." Little love was exchanged between the blunt architect and the country folk.

The château of Pierrefonds (pp. 36, 37) in the Ile-de-France region north of Paris is the most vulnerable of his works to charges of inappropriate reconstruction. Partly razed on the advice of Richelieu, the château was receding into the landscape until, at the orders of Emperor Napoleon III, Viollet-le-Duc undertook rebuilding in 1857. For 13 years the architect worked at the ruins under the close direction of the emperor.

J.P. Paquet, chief architect of historic monuments in France, said "Pierrefonds is only the grafting onto a medieval base of an edifice conceived for the needs of hunts and parties of the court."

Auzas also pleaded Viollet-le-Duc's case to me in similar sympathetic terms. "The great staircase in the courtyard is perhaps not in keeping with the place. But remember he was working for an emperor and,

Viollet-le-Duc's greatest task, in terms of sheer size, was the restoration of the walled city of

above all, an empress. What woman does not dream of a triumphant descent down an immense staircase to an admiring court? So Viollet-le-Duc had to give her the staircase regardless of the castle's history."

His crowning achievement, the restoration of the walled city of Carcassonne (below) near the Spanish border, was marked by running battles with the local clerics and the citizenry, who had grown accustomed to using the magnificent walls built by Visigoths in the fifth century and by France's first strong kings in the 13th century as a quarry of cheap stone blocks for building pigsties and cow barns.

More criticism has been leveled at Viollet-le-Duc for his restoration of Carcassonne than for any of his other works. Typical is the complaint that he roofed the 49 towers that guard the double walls with slates in the supposedly Burgundian style rather than with tiles in the meridional style.

Auzas showed me, however, a Viollet-le-Duc watercolor of the proposed restoration of the fortifications at the Narbonne Gate. It is roofed with tiles. The slates evidently were put there by a successor.

In recent years Viollet-le-Duc has gained some respect in France, especially among the more prestigious art historians. As one of the great architectural theorists of all time, he wrote, among many other works, the monumental *Dictionnaire raisonné de l'Architecture française du XI^e^ au XVI^e^ siècle* and the *Discourses on Architecture,* which forecast modern building methods. Though he never used the word *functionalism,* his writings are saturated with the concept. He predicted reinforced concrete, prefabrication and even the skyscraper.

Viollet-le-Duc was a man of fascinating consistency and contradiction. He was one of the purest products of the Romantic movement, which witnessed the revival of the Gothic style throughout Europe, and he probably knew more about Gothic buildings than anyone before or since. But he also reflected the 19th-century preoccupation with rationalism, which caused him to assume that medieval buildings were designed with the absolute structural logic that he saw in them.

His carefully considered additions and alterations to France's medieval buildings have now acquired a historic interest of their own. As a result, the reputation of the great restorer is itself being restored.

Carcassonne. Begun in 1844, the restoration continues in one form or another up to this day.

By Richard Wolkomir

By the atarnal, Yankee Jonathan!

He was America's first national symbol; though he could cheat the paint off a wagon, he left an indelible mark on Uncle Sam

Wherever the old-time peddler traveled, he could scare up customers for his New England wares.

Even before the Republic was born, the New Englander was regarded as a special type by everyone else. William Beekman, a businessman in colonial Manhattan, complained: "Seven-eighths of the people I have credited in New England have proved to be such damned, ungrateful, cheating fellows that I am now almost afraid to trust any man in Connecticut. . . ." And Stephan Collins, a Philadelphian of the same era, called Boston merchants "deceitful, canting, Presbyterian deacons."

Just after the Revolution, John Bernard, a famed English comedian, toured the States and noted that the New England peddler "is regarded by the Southern trader in the light of a visitation; he may be truly said to have Yankee-phobia, and to look upon a 'Connecticut chap' as a commercial Scythian, a Tartar of the North whose sole business in life is to make inroads upon his peace and profit. He ranks him in the list of plagues next to the yellow fever, and before locusts, taxation, and a wet spring; indeed, some go so far as to suppose that a shower of Yankees was the crowning pestilence which made Pharaoh give up the Israelites."

The Yankee was the United States' first regional stereotype. The Dutch of New Netherland might have claimed that distinction, but by 1800 they were mostly absorbed. An Englishman observed that Americans had no regional dialects, "except it be the New Englanders, who have a sort of whining cadence."

As the first uniquely American personality, the Yankee was as fascinating to the former Colonies as a first baby is to newlyweds. Like new parents, Americans couldn't resist telling and retelling stories about him, exaggerating a bit more each time.

All enduring myths have real roots. Forced to exert mind and body just to keep alive during subzero winters, early New Englanders on their stony farms had to be resourceful and energetic. And, while nature in New England was stingy with warmth and rich soil, she was generous with waterpower. Soon the old Puritan formula of a town built around a church had become in many places a town built around a factory.

Thus, while the South developed an agricultural society with a landed aristocracy resembling Europe's, New England was speaking its own lingo, producing everything from razors to clocks and carts and looking southward with interest, for there lay an inviting market. Only sketchy paths connected early America's handful of raw settlements, and so the natural way to move goods through the countryside was on foot. For men with long legs, there was money to be made.

All over New England, in Hartford, Worcester, Newport, Rutland, Hanover and a hundred other towns, enterprising young men shouldered great packs filled with combs and buttons, jewelry, needles, knives, and razors—"Yankee notions"—and started walking. They were unusual, these peddlers. Most of them were

Originally from upstate New York, author Wolkomir is now free-lancing out of Calais Stage, Vermont, where he picks up a good many of his Yankee notions.

As a peddler, Brother Jonathan was a real buster. It was said he could sell warming pans in Jamaica, iceboxes in Quebec, a whole family of foxes to a chicken farmer and seven lean years to a pharaoh.

a kind of super Yankee. For one thing, the hike from Penobscot Bay to Savannah, Georgia, say, is no Sunday stroll, especially with a bulging pack. There probably never was a fat peddler. They were rangy and lean. They were also self-contained, used to days of lonely hiking between backwoods settlements. A stranger wherever he went, the peddler learned to trust only his own wits. And, of course, he was either going to be a sharp businessman, selling and swapping advantageously, or he was going to be hungry. Few starved.

Was the Yankee dishonest? Thomas Hamilton, an Englishman who toured the United States in 1833, leaves little doubt: "The whole race of Yankee peddlers in particular are proverbial for dishonesty. They go forth annually in the thousands to lie, cog, cheat, swindle, in short, to get possession of their neighbor's property in any manner it can be done with impunity. Their ingenuity in deception is confessedly very great. They warrant broken watches to be the best timekeepers in the world; sell pinchbeck trinkets for gold; and always have a large assortment of wooden nutmegs and stagnant barometers."

However, in those days business morality was sketchy everywhere, the scandalous "purchase" of Indian lands for a few beads being one example. Thousands of bales of American cotton once lay unbought on the wharves in Liverpool because the South's planters had tried to fatten them with pebbles and sand. Probably the Yankee was no worse. But apparently he was sharper. People tried to fool him and failed. Stories arose about these crafty Yankees—so many stories, so incredible that soon the Yankee peddler was as mythological as an elf. Long-backed and thin, they said he was, "lank as a leafless elm." He always dressed in butternut brown. No door could be locked against him and, once he was in the house, silver leaped into his pocket of its own accord.

He is said to have sold warming pans in the West

Drawings by Arnold Roth

Indies and white paper hats in Canada—but there was no market because of the cholera, and so he ground up his hats in a mortar and made them into pills. He traveled alone, didn't talk politics, drink or gamble. When he had finished bartering, he became as wooden as the dishes in his pack. Yet he was proud and prickly, capable of tart rejoinders.

"Down East," said a Southerner to a peddler, "a cow and a calf and a calico frock is said to be a girl's portion, and that's the place you come from."

"Well," said the Yankee, "and you're from that place, ain't you, where a potato patch has cracks in it so wide the grasshoppers can't jump over, and that's the portion of the eldest son? My father told me that he was drivin' by one of your great farms, observin' the wretchedness of the land, and he said, 'the fellow that owns this must be plaguey poor.' 'Not so poor as you think,' said somebody from the blackberry bushes, 'for I don't own but a third on't. My father give away one third to a man to take t'other!' "

No one could best a peddler. Rip Van Winkle's shrewish wife died when "she broke a blood vessel in a fit of passion at a New England peddler." People chuckled over how the Down East sea captain had outwitted the London dandies, and over the way a Yankee always answered a question with another question, and over the Yankee's genius for practical jokes.

British troops during the Revolution had used the word "Yankee" as a mocking epithet for New England colonials. The New Englanders, in turn, began calling themselves Yankees, and proudly. When a British officer composed the sarcastic lyrics for "Yankee Doodle," the New Englanders promptly adopted that too. During the Civil War it was banned in South Carolina.

Up until that time, though, the Yankee was an important figure to Americans in all parts of the young country, because the new United States had no cultural identity, no personality. Americans had always thought of themselves as British, but after the Revolution Englishmen pilloried them as tobacco-chewing barbarians who lived in ugly towns devoid of all but the rudiments of civilization. Democracy produced nothing but rude boors, who were dishonest besides—witness the Yankee peddler!

With little history and no national identity to fall back upon, Americans were stung. "Why are we so exquisitely alive to the aspersions of England?" Washington Irving wondered. He put it mildly. As late as 1848 some British actors who had criticized American manners sparked the Astor Place Riot. Naming the three most notorious book-writing British tourists, actress Fanny Kemble warned: "I would not advise either Mrs. Trollope, Basil Hall or Captain Hamilton ever to set their feet upon this ground again, unless they are ambitious of being stoned to death."

As they had done with the mocking "Yankee Doodle," Americans now made the Yankee himself into a national symbol, like England's John Bull. The first step came in 1787, with the production of a play called

When Jonathan wasn't peddling, he was whittling.
"The Yankee boy, before he's sent to school

The Contrast, the first native comedy to be professionally produced. The author was Royall Tyler, a Boston-born, Harvard-educated lawyer who had lived in Portland, Maine, where he must have carefully observed rural New Englanders.

Tyler's plot was allegorical: An American father has engaged his daughter to a hypocritical British rake, although the girl yearns to marry a patriotic American, Colonel Manly. By the story's end the British dandy has been exposed as a plotting blackguard and Colonel Manly and the heroine are at last united. The presiding genius of all this intrigue is Manly's servingman, Jonathan, a Yankee.

In this early play the Yankee character is still undeveloped, and Jonathan is something of a rustic clown, full of queer phrases—"By the living jingo!" "What the rattle?" "Smite my timbers!" "Maple-log seize it!" and "Swamp it!" However, "the contrast" of the title was between an English personality, hypocritical and decadent, and the roughhewn American democrat, who far exceeds his counterpart in wit. Jonathan therefore frequently thunders with patriotic bombast—"True blue son of liberty!" or "True blue Bunker-Hill son of liberty!" or even "True-born Yankee American son of liberty!"

Well knows the mystery of that magic tool,
The pocket knife," wrote poet John Pierpont.

Tyler struck an enduring chord in the American character when he combined national pride with good-humored self-mockery. At one point in the play Jonathan says of "Yankee Doodle": "I can't sing but a hundred and ninety-nine verses; our Tabitha at home can sing it all." Audiences chuckled and applauded.

After *The Contrast* came the deluge. The public's appetite for plays about Yankees proved voracious, and playwrights seemed to materialize from the air. Their themes were invariable: the superiority of the rustic American to the urbane Englishman. Each play pivoted about a Yankee character, who seemed mild and dull but was really calculating and sharp. He might be a peddler, a sailor, a Vermont wool dealer or just a Green Mountain boy who swapped and whittled and upset calculations. Often the Yankee was a globe-trotter: Titles offered *The Yankee in Tripoli, The Yankee in China* and *Jonathan in England.* There were also *Bumps or Yankee Magnetism* and *Sam Patch, the Yankee Jumper.* Wherever in the world he was, the Yankee's stage costume usually was the same—a white bell-crowned hat, a blue coat with long tails, red and white trousers, and high bootstraps. He was on the way to becoming Uncle Sam.

Yankee roles of George H. Hill

More important to the audience than the plot was the ability of the actor who played the Yankee. Thespians like Charles Mathews, James H. Hackett, Danforth Marble and Joshua Silsbee helped form the nation's idea of Yankee character. Greatest of them all was George Handel Hill, Boston-born scion of a Rutland, Vermont, family. In Hill, Yankee myth and reality were united, for he himself was one. As esteemed in his native New England as in New York or London, Hill was often invited to "come down our way and give a show." Once a Maine farmer was irked because he thought Hill had not come and that the Yankee part was being played by one of his own neighbors. It turned out to be Hill after all.

Hill's New Englander was quiet and low-voiced, a mild man who whittled while he talked. Alone on the stage, Hill could create a gaggle of awkward young Yankees at militia training, a New England family at home, or a lecturer excessively satisfying the New England thirst for abstruse discussion. He sprinkled his monologues with vivid expressions: "strong as whitleather," "coming on full chisel," or "so thin you could pitch him clean *through* a flute."

In the late 1820s, while the Yankee theater was in full swing, a native of Maine named Seba Smith intro-

duced America to a literary creation named Colonel Jack Downing, who would keep readers laughing for 20 years. The first of the "Downing Papers" appeared in a Portland newspaper. It was in the form of a letter from young Jack Downing to the folks back home in Downingville, Maine. Jack had come to Portland to sell some ax handles and cheese, but he wasn't especially successful. However, after exhibiting his watch in a tavern, a man stepped up and offered to trade: "Says he, I'll give you my watch and five dollars. Says I, it's done! He gave me five dollars and I gave him my watch. Now, says I, give me *your* watch—and says he, with a loud laugh, I han't got none—and that kinda turned the laugh on me. Thinks I, let them laugh that lose. Soon as the laugh was well over, the feller thought he'd try the watch to his ear—Why, says he, it don't go—No, says I, not without it's carried."

Jack had ambitions, for he hoped to make "them 'ere chaps that have been asneering at me here stare at me like an owl in a thunderstorm." Before long, he was comfortably settled in Washington as President Andrew Jackson's personal adviser. Thus, as Seba Smith drew him, the Yankee became the sly oracle.

Jack Downing was the President's friend, and that relationship was humanly drawn with folksy monologue, but underneath ran an acid criticism of Jacksonian democracy. In his letters (addressed to Uncle Joshua, Aunt Nabby, or "To my old friend, the Editor of the *Portland Courier,* in the Mariners' Church Building, second story, eastern end, Fore Street, away Down East in the State of Maine") Downing dryly lampooned office seekers and land speculation. Later, of the Mexican War, Jack wrote, "Uncle Joshua always says, in nine cases out of ten it costs more to rob an orchard than it would to buy the apples."

Seba Smith's Downing Papers inspired scores of imitators. One, Sam Slick, the Yankee clock peddler, spent three decades hoodwinking customers, to the merriment of readers. James Russell Lowell's Hezekiah Biglow spoke in verse, as in this description of a New England courting:

He stood a spell on one foot fust,
Then stood a spell on t'other,
An' on which one he felt the wust
He couldn't ha' told ye nuther.

Lowell eventually used his Yankee poems to fight for abolition, combining the nasal twang, the iron-willed self-righteousness and the macabre humor of his Yankee heritage into a mixture so explosive it surprised even its author—"The success of my experiment soon began not only to astonish me, but to make me feel the responsibility of knowing that I held in my hand a weapon instead of the mere fencing-stick I had supposed."

In 1828 a newspaper called *The Yankee* was founded, and it overflowed with sketches from "about the middle of down east" and with serious definitions of Yankee traits. Actors from the Yankee theater, and scholars, too, trekked to New England to study the phenomenon in its natural habitat. Many of them, like actor James H. Hackett, composed long lists of Yankee traits and peculiarities. David Humphreys, a playwright, prepared a glossary of Yankee lingo in 1815. "Atarnal" means eternal, he noted, while "fairce" means fierce and "Varmount" means Vermont.

Writer John Neal said: The word *Yankee* is no longer a term of reproach. It is getting to be a title of distinction." To which Seba Smith added: "So far from being a talking boor, he is on the contrary singularly wise, penetrating and observant."

The United States emerged from the post-Revolutionary period as Brother Jonathan, a gawky New England country lad whose mild countenance masked a shrewd mind. But the Yankee hailed from just six small Eastern states, and a vigorous young America was straining toward the Pacific. By 1850 a new mythical figure—the Western woodsman, a ripsnorter full of braggadocio and tall tales—had eclipsed the Yankee.

He may have stepped from the spotlight, but the Yankee has never left the stage. Serious writers from Hawthorne and Melville to Robert Frost have explored the somber Puritan strain beneath Jonathan's mild mask. Even today, our picture of the New Englander is partly rooted in the stage Yankee. Foreigners still call all Americans Yankees, and an adaptation of the red, white and blue costume Yankee Jonathan sported 170 years ago is still worn by Uncle Sam.

Yankee verity: oft-proved by firm injunctions
to heaven to strike him dead if. . . .

All that I have in life, I owe to it. To it I have given my time, my talents, and for it I have cheerfully risked my life, my fortune, and my sacred honor.
John Adams

PLATE SHOWN ACTUAL SIZE.

OFFICIAL BICENTENNIAL COMMEMORATIVE PLATE

of The Bicentennial Council of the Thirteen Original States

"Adams Champions the Cause of Independence"

LIMITED EDITION / GOLD ON STERLING SILVER / 8" DIAMETER

The Bicentennial Council of the Thirteen Original States announces its Official 1974 Bicentennial Commemorative Plate

Orders must be postmarked by July 31, 1974
Limit: One plate per person

THE BICENTENNIAL COUNCIL OF THE THIRTEEN ORIGINAL STATES, which represents the official Bicentennial commissions of the thirteen original states, is dedicated to making the nation's forthcoming Bicentennial a time for revitalizing the spirit of the American Revolution. A time for remembrance, rededication and commemoration.

With purpose and with pride, the Council is officially commemorating the momentous events which culminated in the Declaration of Independence by issuing a series of annual Bicentennial Commemorative Plates in strictly limited edition. The first such plate was issued in 1973 in honor of Thomas Jefferson, author of the Declaration.

The Council is now preparing to issue its Official Bicentennial Commemorative Plate honoring John Adams, the great American patriot who played perhaps the most important role of all in the adoption of the Declaration of Independence.

A unique combination of gold and silver

This Official Bicentennial Commemorative Plate will be minted in solid sterling silver. The sculptured scene of John Adams, eloquently pleading the cause of independence before the Continental Congress, is in 24 karat gold electroplate on sterling. And the legend on the rim will be etched and inlaid in 24 karat gold.

To produce this extraordinary commemorative plate for each subscriber, the Bicentennial Council has appointed The Franklin Mint, America's largest private mint and foremost producer of fine collector's plates and works of medallic art in precious metal. Each Bicentennial Commemorative Plate will bear a registered serial number and the prized hallmark of The Franklin Mint.

The number of plates to be issued will be determined by the number of orders postmarked by the deadline date of July 31, 1974. There is an absolute limit of one plate per person.

The edition will thus be forever limited to the exact number of orders entered by the closing date. In addition, one plate will be reserved for presentation to the Presidential library, one for Independence Hall in Philadelphia and one for each official Bicentennial commission of the thirteen original states.

Adams plate records the drama of 1776

When the Boston Tea Party ignited the flame of freedom in the American colonies, a Massachusetts lawyer named John Adams called it the grandest event since the controversy with Britain began.

Later, as a delegate to the Continental Congress in Philadelphia, John Adams became the leading spokesman for independence. Throughout the hot summer of 1776, no man faced a more difficult challenge. But his passion in arguing for independence later led Thomas Jefferson himself to say of Adams: "He was the pillar of its support . . . its ablest advocate and defender."

History will forever record that it was John Adams, speaking on July 1, 1776, who rallied the delegates to the cause of independence through the conviction of his words and the power of his personality.

Appropriately, this Bicentennial plate portrays John Adams at a moment of high drama on that fateful day, and bears his words: "all that I hope for in this life I stake on our cause."

A historic series

Following the issuance of this Bicentennial plate, two additional plates will be issued by the Bicentennial Council. In 1975 the Council will commemorate Caesar Rodney's desperate ride to break the deadlock in the Delaware delegation. And in 1976, at the height of the Bicentennial era, the final plate will honor John Hancock's leadership as President of the Continental Congress and the first to sign the Declaration of Independence.

As an owner of the John Adams plate, you will have the opportunity to acquire each of the subsequent Bicentennial plates. You will, of course, be under no obligation to acquire these issues. But you will be notified in advance of each issue and given the opportunity to obtain it if you wish.

The Bicentennial Council now invites you to join in the commemoration of our nation's Bicentennial by acquiring the John Adams plate for your family. This solid sterling silver plate, with its registered serial number, will be sent to you packaged in a deluxe library case.

Edition closes July 31, 1974

This is the only time that this historic commemorative plate can be offered. To take advantage of this opportunity, *please be sure the order form below is mailed by July 31st.* Orders postmarked after that date must be regretfully declined and returned.

Because of its historic significance, its beauty and intrinsic value, this plate is destined to become one of the most important heirlooms of the Bicentennial era —a treasure to be enjoyed now and later passed along to future generations.

ORDER FORM

OFFICIAL BICENTENNIAL COMMEMORATIVE PLATE

Limit: One plate per person
Valid only if postmarked by July 31, 1974

The Franklin Mint
Franklin Center, Pa. 19063

Please accept my order for the Bicentennial Council's commemorative plate honoring John Adams. This limited edition plate will be minted in solid sterling silver and 24 karat gold on sterling, serially numbered and registered in my name.

I enclose $45.* as My Cash Down Payment toward the Total Cash Price of $225.* After I receive the plate, please bill me for the unpaid balance of $180.* at the rate of $45.* a month for 4 months. There is NO FINANCE CHARGE.

** Plus my state sales tax*

Mr.
Mrs.
Miss _____
PLEASE PRINT CLEARLY

Address _____

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Signature _____

All orders are subject to acceptance by The Franklin Mint.

The Franklin Mint is the world's largest private mint. It is not affiliated with the U.S. Mint or any other government agency.

31-86

By Michael Collins

Carrying the Fire: the fire carrier tells it like it was

The hectic build-up before Apollo 11's blast-off is described by astronaut Collins in these excerpts from his book on the historic mission

[For 46 years, millions of visitors to the Smithsonian have gazed at the small, old-fashioned monoplane in which Charles A. Lindbergh flew from New York to Paris, and so lifted aviation out of its childhood.

Just 12 feet from that plane's left wheel is one of the four splayed landing pads of a lunar module, back-up model of the one that first brought men to the moon in July 1969, and so raised astronautics from its infancy. While two men landed the duplicate of this vehicle at Tranquility Base, another man, the command module pilot, orbited the moon. This spaceman is the author of *Carrying the Fire*. Fittingly, the foreword is provided by the pioneer airman of an earlier time, Charles Lindbergh. "From Armstrong's and Aldrin's spectacular movements," writes General Lindbergh, "my mind shifted to Collins' lunar orbiting. He had time for contemplation, time to study both the nearby surface of the moon and the distant moonlike world. Only once before had I felt such extension as when I thought of astronaut Collins. That was over the Atlantic in the *Spirit of St. Louis*."

What follows is Collins' account of his preparation.]

I was much relieved to find my name had been submitted, along with those of Armstrong and Aldrin, for approval as the prime crew of Apollo 11. I cannot for the life of me remember how I acquired this information, from Neil Armstrong most likely, but I'd feel like an ass checking the point ("Er . . . say, Neil, did you ever tell me I was supposed to be on your crew, you remember, that one that went to the moon?"). The three names had to be approved by NASA headquarters. The first indication that they had done so was when my wife Pat started getting phone calls.

Armstrong and Aldrin. Smart as hell, both of them, competent and experienced, each in his own way. Neil was far and away the most experienced test pilot among the astronauts, and Buzz the most learned. But that didn't mean that Neil was all pragmatist or Buzz all theoretician. Among the dozen test pilots who had flown the X-15 rocket ship, Neil had been considered one of the weaker stick-and-rudder men, but the very best when it came to understanding the machine's design and how it operated. Buzz, far from being an academic recluse, was an outstanding athlete, a pole-vaulter and a Korean War MIG killer. They were a formidable array of talent.

The special nature of the Apollo 11 flight was swiftly brought home to me. Astronaut Joe Kirwin grabbed me first off to review the design of the BIG, one of his areas of responsibility. The BIG tided one over until he was inside the MQF, which led to the LRL, of course. Behind these meaningless letters lay a vital concern—the possible contamination of this planet with extraterrestrial bacteria or other hazardous life forms. The BIG was the biological isolation garment, which acted as the barrier between our three possibly contaminated bodies and those of three billion other humans. The idea was that, after the command module landed in the Pacific, we would cautiously open the side hatch and the swimmers would throw three BIGs in to us. We would don them before emerging, closing the command module hatch behind us. Then we would be transferred from a life raft into a helicopter and onto an aircraft carrier, where we would walk below decks into the MQF (mobile quarantine facility), a glorified house trailer, modified with filters and other accouterments to ensure a biological seal. Once locked inside (along with a physician and an engineer), we could remove our BIGs. When the carrier reached port at Honolulu, the MQF would be hoisted off by a crane and loaded onto a giant C-141 jet transport for the flight back to Houston, where it would again be transferred by flatbed from Ellington AFB to the LRL. The LRL was the lunar receiving laboratory, equipped with elaborate facilities for examining moon rocks, and us. The principal indicator in this examination was the health of a white mouse colony, whose inhabitants were to be exposed in various ways to us, our equipment and our treasures. If the mice started dying, baby, we were in trouble!

In the six months remaining before July 16, I was busier than I had ever been in my life. I could easily have spent eight hours a day in the simulators, but there was a host of other events requiring the presence of the crew. I have never kept a diary, but for some reason the events of April 14 seemed worth recording and I jotted down some notes.

A typical long, hard day

The day began in Houston with the centrifuge, never pleasant, but especially bad when imitating lunar returns. At ten Gs my chest caves in and my vision narrows, and when I finally reeled out of the torture chamber, I dared not turn my head left or right, lest I tumble my gyros and fall over in an undignified heap. But leave I had to, and quickly, for I was scheduled for the CM (command module) simulator, where over and over again I practiced entering the Earth's atmosphere, just as I had been doing in the centrifuge. Only this time there was only the familiar one G, rather than the brutal ten of the centrifuge. Instead, the hazards were more mental than physical, and I was called on to solve a series of mysteries involving obscure equipment failures. Some I won, but more than once I plummeted into the sea with parachutes still unfurled, theoretically destroying myself, along with Neil and Buzz (assuming I hadn't already left them for all time on the surface of the moon).

Then I hopped into a hot and bulky pressure suit, as we had to have a crew picture taken in front of a five-foot, faintly blue moon. It was now time to go to the airport, to plan a T-38 flight to the Cape, but first I had to call home and make sure I hadn't forgotten to let Pat know about my absence for a day or two. At home all was chaos—our dog had bitten a neighbor's child, not seriously, but rabies tests were required, etc., etc. I was no help, and could only make a few clucking noises while I filled out the flight plan. Then hurry and leap off into the night sky, promptly at seven, with no dinner and no promise of getting to the Cape before everything closed. Please, God, no emergencies tonight, I am just too tired to pump the adrenalin re-

Astronaut Collins, here suffering in a simulator is now Director of the Smithsonian's National Air and Space Museum. His book, *Carrying the Fire,* appears later this month, five years after Apollo 11's flight.

© 1974 by Michael Collins. From the forthcoming book CARRYING THE FIRE by Michael Collins, with the permission of Farrar, Straus & Giroux, Inc.

Collins and his wife relax at Cocoa Beach, Florida, where Mike has a chance to read a stack of paperbacks.

quired for coping . . . just let me be, let me sit here and guide this missile through the darkness without any hassles, that is about all I am capable of doing.

Another night, late, I was coming home from Dover, Delaware, and passed over my old hometown of Washington. God, it looked good to see familiar surroundings! There lay Washington and Baltimore, shimmering like twin jewels in the night mist. I identified the Potomac River flowing by Alexandria, where my parents lived for many years, and my mind wandered off into a string of teen-age memories. From 43,000 feet I let my eye roam across the river, past the White House, and up Massachusetts Avenue to the Washington Cathedral. Next came a shock—the Cathedral had been moved! Could I have been disoriented? Of course! I had been looking at the city from the north, not from the south. Worse yet, if that were true, then I had not been looking at Washington at all but at that alien city of Baltimore. What I had first picked as my old Alexandria neighborhood was no doubt a cluster of honky-tonks on Route 40 north of Baltimore. With a jolt I realized it had been a long day and I was making mistakes no alert air cadet would; this guy who couldn't tell Washington from Baltimore was within a few months of navigating to the moon and back.

There were times when I struck out on my own, and other times when Neil, Buzz and I trained as a unit. They were good workers. Neil was clicking along like a well-oiled machine, his manner nonchalant. Buzz was all business as usual. Generally quiet and incapable of small talk, Buzz could get wound up on any of a number of technical pet projects far into the night, with or without a bottle of Scotch for lubrication. Having the constitution of a horse, Buzz would be up again in a couple of hours, none the worse for wear, eager to dive into the simulator once more. They were a tough and knowledgeable pair, both of them far better engineers than I.

Consider someone who has never ridden in a car before. Without actually letting him drive, prepare him for a trip across Los Angeles, from Downey down the Long Beach Freeway, then up the San Diego Freeway to the airport. Along the way, let him have a high-speed blowout, change the tire, and proceed. Explain to him the rules of the road, the operation of the machinery, the physical coordination of clutch, brake and gas, the feel of the wheel. Condition him to red lights, flashing ambers, the glare of oncoming brights. Trust him to make that trip the first time, by himself, without dinging a fender. Farfetched perhaps, but that is how we did it on Apollo. To car or cockpit, one hooks up a huge computer to make every gauge, pedal, handle and switch perform as realistically as possible. The gas tank empties as the miles click by; the oxygen pressure increases as the heaters are turned on. Outside the window the real world is more difficult to duplicate, but in the most important respects it can be done. Filmed cars can be made to whiz by in adjacent lanes, star fields can be precisely duplicated out the spacecraft windows. Navigation is easy: The signs pointing to the San Diego Freeway can be duplicated precisely, the lunar horizon less

accurately, but accurately enough to measure the angle between it and a selected star. Malfunctions can be inserted. The steering wheel can be made to shimmy and shake for a few seconds before pulling violently to one side as a front tire blows. The stabilization and control system can suddenly develop a short circuit, causing one thruster to fire continuously and to topple the spacecraft end over end.

The reason one does not do it for an auto trip is that there are easier, cheaper, more reliable ways of making the trip (let your wife drive), but for space flight a good simulator is an absolute must. The whole thing cost millions of dollars and took hundreds of people to maintain, working three shifts, seven days a week. Naturally, it wasn't always in perfect operating order, and often it seemed easier to get the actual spacecraft to fly than to get the simulator to duplicate it. In the astronaut office, one of the most common greetings was an accusatory, "Aren't you supposed to be in the simulator?" and the usual answer was, "Yeah, but the frapping thing bombed out again."

Choosing an emblem for the flight

There were a variety of nontechnical chores, such as thinking up names for our spacecraft and designing a mission emblem. We felt Apollo 11 was no ordinary flight, and we wanted no ordinary design. We needed something simple, yet something which unmistakably said peaceful lunar landing by the United States. Jim Lovell, Neil's back-up, introduced an American eagle into the conversation. Of course! What better symbol—eagles landed, didn't they? At home I skimmed through my library and finally found what I wanted in a *National Geographic* book on birds: a bald eagle, landing gear extended, wings partially folded, coming in for a landing. I traced it on a piece of tissue paper and sketched in an oblique view of a lunar surface.

I described my efforts to Jim Lovell, and he and I both agreed that the eagle alone really didn't convey the entire message we wanted. The Americans were about to land, but so what? Tom Wilson, our computer expert and simulator instructor, overheard us and piped up. Why not an olive branch as a symbol of our peaceful expedition? Beautiful! Where do eagles carry olive branches? In their beaks, naturally. So I sketched one in, and we were ready to go to press.

Washington usually rubber-stamped everything. Only this time they didn't, and our design came back disapproved. The reason? The eagle's landing gear, powerful talons extended stiffly below him, was unacceptable. It was too hostile, too warlike; it made the eagle appear to be swooping down on the moon in a very menacing fashion. What to do? A gear-up approach was unthinkable. Perhaps the talons could be made limp like a receiving-line handshake. Then someone had a brainstorm: Just transfer the olive branch from beak to claw and all menace disappeared. The eagle looked slightly uncomfortable in the new version, clutching his branches tightly with both feet, but it greased on through channels.

The weeks seemed to fly by in the spring of 1969. It seemed that we had a year's work still ahead of us in May, when suddenly we found ourselves the next crew to fly. Tom Stafford, John Young and Gene Cernan departed the Cape around noon on May 18. They arrived at the moon three days later, and became the fourth, fifth and sixth humans to see it at close range. Stafford's and Cernan's job was to descend to 50,000 feet in their LM, *Snoopy*, and then return to John Young in *Charlie Brown*. This was the whole point of the flight, to check out the LM in its native habitat, to swoop down over the Apollo 11 landing site and photograph it, and finally to demonstrate a rendezvous.

Fortunately, all went according to plan and the rendezvous was a piece of cake. Neil, Buzz and I breathed a sigh of relief, not only to have Tom and Gene return safely to the CM, but also—more selfishly—to see the way cleared for 11 to attempt a landing instead of merely repeating this dry run. Tom and Gene had experienced no difficulty except for a brief tussle with the LM's control system, during which they had gyrated enough to cause Gene Cernan to exclaim for all the world to hear, "Son of a bitch!" Cancel his Boy Scout membership and hire four more stenographers to handle the influx of mail.

We were inundated with the thorny, technical unknowns that still faced us. One of my problems was the mechanism that linked the CM and LM together,

Shortly before their flight, Neil Armstrong, the author and Buzz Aldrin try to ease tensions.

In command module simulator, Mike practices celestial navigation—hopefully moonward.

the probe and drogue. When the CM first docked with the LM, it gently placed its probe inside the LM's drogue, and three tiny little prongs ("capture latches") around the rim of the probe snapped into place. The two vehicles were then tenuously tied together by these little paper clips. As soon as the command module pilot (CMP) detected this fact and further ascertained that the two vehicles were not swaying excessively, he flipped a switch. This caused nitrogen gas under pressure to retract the probe inside the CM, dragging the LM with it. The motion stopped when the CM's tunnel butted up against the LM's tunnel, at which point 12 mechanical latches were triggered and the LM and CM were held together in a vise grip. Now the CMP stopped being a pilot for a while and assumed the mantle of master mechanic. The probe, inside the tunnel, was in the way and had to be removed, as did the drogue, so that people could pass back and forth; but before that could take place, there was an incredible checklist to perform, full of mysterious notations such as "Preload Selector Lever—rotate clockwise (away from orange stripe), Preload handle-torque counterclockwise to engage Extend Latch (red indicator not visible)," and on and on. If the thing refused to budge, I was supposed to get out the tool kit and dismantle it. Me, who couldn't repair the latch on my screen door. I hated that probe, and was half convinced it hated me. I complained that the space program needed more English majors to write checklists ("The capture latch release handle lock, for God's sake! Which one is that?"). Maybe we just needed better mechanics. I wasn't one.

As May turned to June, I was spending more and more time at the Cape, and less and less in Houston and other places. I was still weekending in Houston, but had to leave early (my records show takeoffs as early as 4:55 A.M.) Monday morning to get down to the Cape for a full day's work. Therefore, it was nice when Pat and the kids came to the Cape for the first two weeks of June. We put up at a motel right on the beach, and Pat had an opportunity to unwind a bit from the turmoil of Houston, where Apollo 11 preflight activities were building into a frenzy of attention from press, friends and interested strangers. Not that the Cape was quiet, but Pat was more or less incognito there, and there was the beach—that great blotter, which always seems able to sop up tensions.

Once Pat and the kids returned to Houston in mid-June, I really began to withdraw from the world. June 17 was a banner day, because I was delighted to hear it announced that July 16 would be it. *Iacta alea est!* The die is cast! That night I moved into the Merritt Island crew quarters for the first time, with my bottle of gin and my bottle of vermouth, and a heavy load removed from either shoulder.

Sealed off from the world

We needed a month sealed off from the world, to live and relive the complex venture before us, and crew quarters was the only place to do that. Only those invited by us could enter, plus a few who worked there, such as the super-efficient maids and Lew Hartzell, the cook. The maids wrote our names on our underwear, starched our polo shirts, and overwhelmed us with cleanliness. Lew had spent years as a tugboat cook, interspersed with forays into the social whirl of yachting, and when he was full of beer he recounted good stories of celebrities falling overboard and other excitement, but mostly he stayed in his kitchen and cooked. His handiwork could best be described as monolithic, with a solid Teutonic base of meat and potatoes, upon which were piled salads, rolls and, of course, a 500-calorie dessert. It did no good to tell Lew that you were on a diet; he took no offense, he simply ignored this irrele-

vant information. The tugboat must plow ahead, even through heavy seas. Reaching the moon obviously necessitated heroic measures in the kitchen. More meat, more potatoes, more bread, more dessert! They would propel us to the moon.

Typically, we got up between six and seven. Usually I had time only for a glance at the paper and a hurried breakfast before I was off to the simulator building a block away, or to some meeting outside the locked door. Generally we would have Lew send lunch to us in sealed containers, and we would stay near the simulators as we munched and answered phone calls. "Oh really, Mrs. _____, you haven't received an invitation to the launch? Why, I can't understand that, anyone as dedicated to the space program as you have been!" Who the hell is in charge of this anyway, and why is this broad calling me? Munch, munch. Lew's sandwiches are three inches thick.

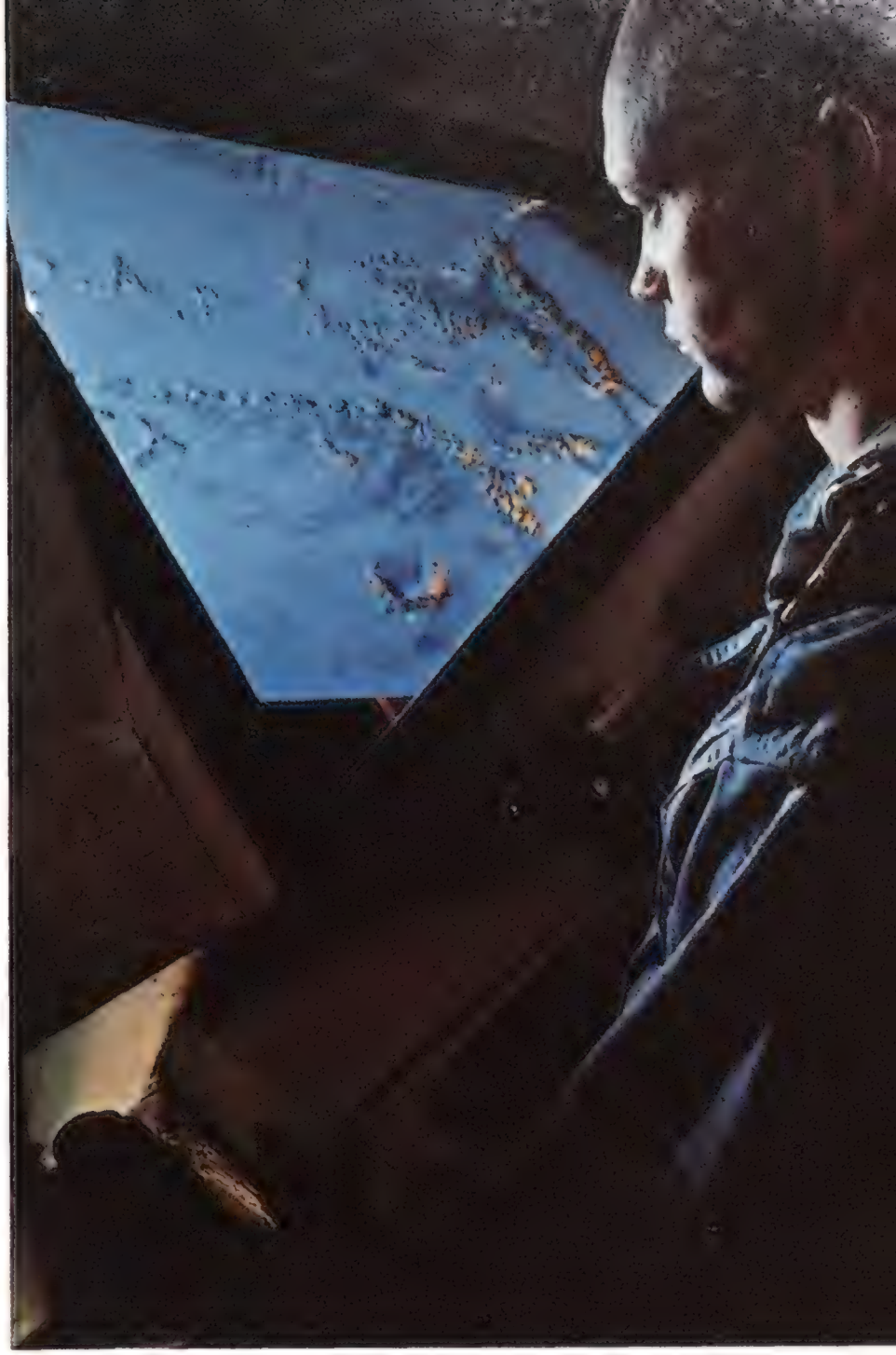
Three men on a treadmill

Occasionally I would pass Neil and Buzz, who were on separate but equal treadmills close by, but it was not until evening that our threesome would convene in crew quarters and have one precious drink before Lew pumped us full of victuals again. After dinner we would hit the books, reviewing phases of the flight plan which saw us acting in concert. Neil and Buzz required a much closer working relationship with each other than either had with me, but nonetheless I found them (especially Buzz) talking to me about events in which I was really not involved.

I recall one bad night following a particularly unfortunate simulation. Neil and Buzz had been descending in the LM when some catastrophe had overtaken them, and they had, in effect, crashed the LM. That night Buzz was incensed and kept me up far past my bedtime complaining about it. As the Scotch bottle emptied and his complaints became louder and more specific, Neil suddenly appeared in his pajamas, tousle-haired and coldly indignant, and joined the fray. Politely I excused myself and gratefully crept off to bed, not wishing to intrude.

In the CM I would be alone except for my computer, Colossus IIA. I felt flea-sized in its presence and punched its keys with a good deal of reverence—that is, until it and I started to disagree and it refused to give me the answers I sought. I told myself that if, on the flight, that son of a bitch mouthed off, I would turn off its power supply.

As the days grew short, my consciousness seemed to expand. I am told that we humans function at only a small fraction of our total capacity, and I believe that if normally I wheeze along at 20 percent of my capacity, then I was up to at least 25 percent. I really



Author studies a projection of the moon's surface through a window of the landing module.

felt awesome responsibility weighing me down, this commandment which said, "Thou shalt not screw up." By flight time, I had tics in both eyelids.

On Friday, July 11, we had our final medical, and on Monday, July 14, a final press conference. The medical exam was short and sweet, the press conference totally banal, both questions and answers. In between the two, on the weekend, I had the first fun I'd had in a long time. I drove down to Patrick AFB, hopped into a T-38 and did acrobatics for an hour, both on Saturday and Sunday. The purpose was not fun and games, but inner ear conditioning. The idea was to perform a variety of violent maneuvers and so slosh around the fluid in my semicircular canals, in poor but hopefully adequate imitation of the sloshing it gets when one moves around in weightlessness.

I took the 15th off and browsed around quarters. I talked to Pat in Houston, and read and reread her last-minute note, which included a poem, obviously not a last-minute thought. It follows in part:

To a Husband Who Must Seek the Stars

In your eyes the first glad token
As when first our love we proved,
So your mind to mine has spoken
Just as if your lips had moved.

You are saying—yes, I know—
That the lure of space beguiles.
You are pleading—"Let me go,"
Not unwilling, but with smiles. . . .

Tell me how you see my role—
To stay, to wait, yet yearn to go.
Where is the comfort for my soul?
You, my love, have helped me know:

I'll be unafraid, undaunted.
Yes, of course! I need not face
Any peril; or be haunted
By the hazards you embrace. . . .

So, for once, you shall not hear
Of the tears, unbidden, welling;
Or the nighttime stabs of fear.
These, this time, are not for telling.

Take my silence, though intended;
Fill it with the joy you feel.
Take my courage, now pretended—
You, my love, will make it real.

I hope I will.

* * *

Four and a half years after Neil and Buzz touched the face of another planet, I look back on the event with a mixture of pride, incredulity and smugness. I am an optimist (I could not have flown in space were I not), but I would have to admit that things have not turned out to be the fairyland that I imagined on the night I was released from the lunar receiving laboratory. I am presently director of the Smithsonian's National Air and Space Museum in Washington, and Neil is professor of engineering at the University of Cincinnati. Buzz, on the other hand, has had a more difficult time of it, suffering bouts of depression severe enough to require hospitalization; presently retired from an abortive attempt to pick up the threads of his Air Force career, Buzz lives in a suburb of Los Angeles. Being an astronaut is a tough act to follow, as all three of us have discovered.

My life-style has not changed as much as I would have guessed. One would think that doing something as bizarre as flying to the moon would result in equally outlandish behavior here, such as spending one week on safari in Kenya and the next diving for abalone off Catalina. However, by and large, one brings back from the moon the same limitations of pocketbook, imagination and taste that one took on the trip. I spend more time at school board meetings than I do at bullfights, and more in supermarkets than in nightclubs.

I find that my two space flights have changed my perception of the Earth. The moon is so scarred, so desolate, so monotonous that I cannot recall its tortured surface without thinking of the infinite variety our delightful planet offers: misty waterfalls, pine forests, rose gardens, blues and greens and reds and whites that are missing entirely on the gray-tan moon.

The television viewers who saw our pictures of the Earth were denied the reality of its impact. To actually be 100,000 miles out, to look out four windows and find nothing but black infinity, to finally locate the blue-and-white golf ball in the fifth window, to know how fortunate we are to return to it—all these add up to a full appreciation of the sight.

The Earth appears "fragile," above all else. As we walk its surface, it seems solid and substantial enough, but from space there is no hint of ruggedness to it; smooth as a billiard ball, it seems delicately poised in its circular journey around the sun. Once this concept is introduced, it leads inexorably to an examination of its surface, and there we find things are very fragile indeed. Is the seawater clean enough to pour over your head? Is the sky blue and the cloud white? Is the riverbank a delight—or an obscenity?

Finally, flying in space has changed my perception of myself. Outwardly, I seem to be the same guy. My wife confirms that fact. But I also feel that I am different from other people. I have been places and done things you simply would not believe, I feel like saying. I have dangled from a cord a hundred miles up; I have seen the Earth eclipsed by the moon; I have seen the sun's unfiltered light. I have seen the ultimate black of infinity. I have been pierced by cosmic rays on their endless journey from God's place to the limits of the universe, perhaps there to circle back on themselves and on my descendants. If Einstein's special theory is true, my travels have made me younger by a fraction of a second. The molecules in my body are different and will remain so until the seven-year biological cycle causes them to be replaced, one by one.

Although I have no intention of spending the rest of my life looking backward, I do have this secret, this precious thing that I will always carry with me.

Collins checks progress of Smithsonian's new Air and Space building, to be opened in 1976.

By Peggy Heinrich and Ray J. Worssam

Bathing machines brought elegance to skinny dipping

Long before the use of the bathing suit, kings and commoners went down to the sea with modesty intact—thanks to this device

Detail of British engraving of 1735 shows mixed bathers in the altogether—via machine.

In our freewheeling time of bikinis and bathing beauties, it is hard to imagine the popularity once enjoyed by a contrivance known as a bathing machine. A prospective swimmer first clambered into a small room on wheels, undressed while it was towed into the sea by a horse, then stepped forth—usually naked and shivering—into three feet of salt water.

Though America seems to have escaped the phenomenon, rows of bathing machines once lined the shores of popular resorts in Great Britain, Europe and Australia. At about the same time that the English decided salt water was healthful rather than harmful, bathing machines materialized, providing in one contraption a dressing room, a modesty screen and direct transportation into the salt water.

Swimmers may have been cavorting in Polynesia and on the West African coast for millennia, but until 300 years ago bathing in the sea was a rare practice in "civilized" countries. Though there are brief references to sea bathing as a medical cure in ancient Egypt and Rome, generally people thought that going into the sea was unhealthy.

Long is the line of major church figures who were antiablutionists. Who knows how many became saints by refusing to bathe? St. Jerome praised those lice-ridden nuns who never let water touch their bodies; St. Francis of Assisi considered dirt a proper insigne of Holy Poverty; St. Boniface forbade mixed bathing. The tradition affected non-Christians as well. In the Middle Ages, the Moors in Spain constructed hundreds of baths, many of them very elegant, especially in Córdoba. When the Christians reconquered the country (Córdoba was captured in 1236), most of the baths were destroyed and the Moors forbidden to bathe. Abstaining from bathing became a reputable act of renunciation; being dirty became a suitable means of mortifying the flesh.

An early medical recommendation of ordinary cold water came in 1709 when Sir John Floyer, credited with being the first doctor to make regular observations on the rate of the human pulse, declared that cold baths would cure rickets in infants and supported total immersion of babies in the baptismal font.

Several years later, together with Edward Baynard, Floyer published a book which deplored the absence of cold-water bathing and blamed public ignorance of the marvelous properties of seawater on the desire of medical doctors to promote more profitable methods of treatment. Floyer and Baynard recommended the

By the Gay Nineties beachwear flourished, yet the bathing machine lingered on.

Coney Island of 1909 displayed far more damp flannel than sunburned skin—or bathing machines.

cold bath as a preventive and curative for all the medical problems of the day. They extolled its ability to strengthen the womb and prevent abortion and touted its powers as an aphrodisiac. That may have clinched it. Their book, *The History of Cold Bathing,* had run through six editions by 1732.

Although sea bathing for pleasure was still considered disgusting and immoral, religious as well as medical authorities began to back Sir John's views. John Wesley, founder of the Methodist church, was an eloquent supporter of the cold-water cure; a treatise on the miracles wrought by cold baths advised that "Welsh women do preserve their children from the Rickets by washing them Night and Morning in Cold Water, till they are three quarters of a year old."

No sooner were the English stepping into the brine than the bathing machine heaved into sight. Exactly when, where and by whom it was invented is debated, but the first pictorial record is believed to be a 1735 engraving by John Setterling (see detail p. 57) which shows men and women bathing nude in the bay at Scarborough. At the water's edge is a horse harnessed to a box about four feet square on wheels about two feet in diameter. While a liveried servant holds the door, a man steps forth naked and no doubt shivering.

The sea bather's need for a bathhouse or changing room was solved by this horse-drawn box on wheels. At each end were a door and a set of steps. The customer entered by the shore end and undressed while a man on horseback towed the machine into the sea. After the horse and rider retreated, the bather would open the door at the sea end and descend into the water. When he was ready to return, he would signal (flags were often used) and the horseman would draw the machine back to shore.

Bathing machines became more elegant and roomy with time. A peaked roof was added to enable passengers to stand comfortably within. The four wheels grew to five or six feet in diameter, which raised the floor of the machine and permitted it to be hauled into water about three feet deep; the room itself continued to enlarge until it was about six feet long by four-and-a-half wide. But the bathing machine never lost its resemblance to a glorified outhouse.

In the water, a "dipper," usually a woman, served the machines' clientele. Fully dressed in black clothes and a bonnet, she would wade along from one machine to the other, lifting or "dipping" reluctant bathers into the sea. In some areas, men dippers attended male bathers.

In 1753 a Quaker named John Beale invented a modesty hood, which was a canvas tent suspended from the sea end of the bathing machine to cover a patch of water where a woman could bathe out of view of the public as well as out of range of the sun. Another refinement was the addition of side wings at the sea end of the bathing machine to shield one's descent into the water. Scarborough experimented with rowboats which were equipped with a hooded section where a bather might undress before plunging into the sea, but these never enjoyed the popularity of bathing machines. Demand for the latter grew so

Ray Worssam, a retired businessman living in Florida, recalls using bathing machines when he was a lad in his native England. He collaborated with Connecticut free-lancer Peggy Heinrich to produce this article.

large that names were chalked on a slate and often one waited several hours for one's turn.

As a remedy, sea bathing was a far cry from mustard plasters and evil-tasting medicines. One of Fanny Burney's journals has an entry dated November 20, 1782, when "Mrs. and the three Miss Thrales and myself all rose at six o'clock in the morning, and 'by the pale blink of the moon' we went to the seaside, where we had bespoke the bathing women to be ready for us, and into the ocean we plunged. It was cold, but pleasant. I have bathed so often as to lose my dread of the operation, which now gives me nothing but animation and vigour. We then returned home, and dressed by candle-light, and as soon as we could get Dr. Johnson ready, we set out upon our journey in a coach and chaise, and arrived in Argyll street at dinner time." The temperature of that water was very likely less than 50 degrees, and Dr. Johnson was the author and lexicographer who showed such concern for correct word usage that he was said to have countered a lady's accusation that he smelt with the observation, "You smell, I stink!" Fanny Burney makes no reference to a bathing machine in that entry, but she would have had no choice but to use one.

By 1803 there were three dozen machines at Scarborough, often with eight or ten in the water at once. Rental fee was only sixpence, but it was customary to tip each of the two attendants a sum equal to the hire of the machine.

In 1784, following doctors' orders, George III visited a small Dorset port for a saltwater cure. As he entered the water from his bathing machine, a band, hidden in another machine nearby, played "God Save the King." All the gentry in the West Country were soon pouring into Weymouth. (Weymouth had been experimenting with two gargantuan bathing machines 30 feet by 20 feet, divided into cubicles, which ran on steel tracks down into the sea, and it was undoubtedly one of these monstrosities that accommodated the band.) Worthing became a popular watering place at the end of the 18th century following a visit by George III's daughter, Princess Amelia; and Southend was bustling soon after her sister, Princess Charlotte, was dipped in its waters.

The public stayed disinterested in the Sussex resort of Hothampton, named after the Southwark businessman, a Mr. Hotham, who built it, until the same teenaged Princess Charlotte arrived for a course of bathing. That was all it needed. As Bognor, it became one of the most popular English resorts. So did Sidmouth after the Duke and Duchess of Kent took the infant Victoria there, even though the latter did no bathing at the time. It was not until she was Queen that Victoria took the plunge, an experience she described in her diary on July 30, 1847:

"Drove down to the beach with my maids and went

Bathing-machine flirtations, as in this Belgian confrontation, were always worth a giggle.

into the bathing machine and bathed in the sea (for the first time in my life), a very nice bathing woman attending me. I thought it delightful until I put my head under the water, when I thought I should be stifled. After dressing again, drove back."

Victoria's bathing machine used to be lowered down a sloping pier in Osborne Bay, Isle of Wight, and is still preserved and on exhibition at Osborne House.

In his poem "Retirement," William Cowper (1731-1800) described the British rush to the seaside:

But, now alike, gay widow, virgin, wife,
Ingenious to diversify dull life,
In coaches, chaises, caravans and hoys,
Fly to the coast for daily, nightly joys,
And all, impatient of dry land, agree
With one consent to rush into the sea.—

There were yet no trains and the hoys he referred to were sailing vessels which plied between London's Tower Pier and Margate, taking anywhere up to 72 hours for the 70-mile journey. By the turn of the 18th century those same hoys were carrying annually 18,000 passengers for a fare the equivalent of a quarter each.

Bathing machines were standard equipment at numerous English seaside villages, especially those within easy coaching distance of London. At first the chief customers were the well-to-do who could afford the fare; the Napoleonic wars had put an end to holidays on the Continent. But railways were speedy and inexpensive. When they reached Brighton in 1841, the 50-mile trip from London became very popular.

Until 1901 sexes were segregated for sea bathing, either by having separate beaches as at Ilfracombe, Devon, where each beach was approached by its own tunnel through the cliffs, or by allocating different times of day for each sex. The convention was not easily broken. In 1877 the Surveyor for the small seaside resort town of Swanage, Dorset, summoned two bathing machine proprietors for allowing a bathing machine appropriated for men to be placed within 200 yards of a "female" bathing machine. He gave evidence in court that he saw the two machines side by side about two feet apart. A lady had rented one and a gentleman the other and before long they were bathing together. The fact that the couple turned out to be man and wife did not save the proprietors from being fined one shilling each, plus costs.

Although English visitors returning from France reported on the excitements of mixed bathing across the Channel, it was not until the second year of the 20th century that an English resort—Bexhill, Sussex—permitted such integration. By then scores of bathing machines adorned English and European resorts.

Some Australian bathing machines had a grill enclosure at the seaward end that could be raised and lowered in order to protect the bather from sharks. The pleasures of surfing were limited not only by sharks but also by strictures that allowed it only *before* sunrise, *after* sunset and never on Sundays. After 1902,

Double-doored British machines carried bathers from Margate's sands to the Channel's chilly waters.

Charge! Door discretely closed, Number 68 churns past the competition on the beach at Boulogne.

when a trio of protesters, one of them an Anglican rector, won a test case for surfing in daylight, it quickly became Australia's most popular sport.

Pictures of bathers at beaches around the world mostly show paddlers and waders; swimming as we know it today developed only in this century. Special clothes for the activity did not appear for more than a century. Several English resorts, notably Scarborough and Margate, originally allowed nude but separate bathing for both sexes. By 1850 sleeveless beach dresses were coming in for modest females. Two decades later, Victorian standards decreed that women use flannel cases and men string-waisted knee-length "caleçons."

The first one-piece clinging stockinette costume for women arrived in 1880, notable because it was worn over corsets. About 1902 Edwardian-style knee-length skirts over petticoats and stockings appeared, and were presumably an improvement over the torture of a whalebone corset in salt water.

The so-called "Canadian costume" came next, consisting of mid-thigh knickerbockers and a tunic with short sleeves and a rounded neck and a hemline low enough to cover the buttocks. This may sound grim by today's standards, but consider what a contemporary writer said about them: "The Canadian costume, when made of wool, seems to be especially designed by Providence to meet the requirements of feminine bathers. The average girl, when she commences surf-bathing, shrinks from notice and chooses a costume of amplitude. After a few weeks of experience she no longer shrinks, but the costume does; and as she gradually grows indifferent to public gaze, the Canadian costume gradually assumes proportions at once useful and picturesque. . . ."

In Japan, according to one story, the Emperor, seeking to introduce Western bathing costumes, ordered his subjects to wear swimsuits when in the sea. So they sunned on the beaches in the nude and dutifully put on garments before entering the water.

Perhaps to the Emperor's credit, there is no record of an attempt to introduce bathing machines to Japan. They were primarily an English phenomenon, evidently well-suited to that country's unique combination of temperament, climate and morality. Soon after World War I, however, bathing machines disappeared completely and inexplicably. Small cabanas, called changing boxes in England, took their place.

Except among nostalgia buffs, the extinction of the bathing machine seems to have occasioned little notice or lament. As Lewis Carroll puts it in "The Hunting of the Snark" (the Bellman is describing the five unmistakable marks by which you may know "the warranted genuine Snarks"):

The fourth is its fondness for bathing machines,
Which it constantly carries about,
And believes that they add to the beauty of scenes—
A sentiment open to doubt.

Text and photographs by Terence Spencer

Replica of Drake's legendary galleon will brave Atlantic

Little is known about the globe-circling Golden Hinde; *but today's version, lovingly built with ancient tools, is a devil to sail!*

Early on a windblown December morning in 1577, a small ship named *Pelican* sailed out of Plymouth, England, to circumnavigate the globe. That little vessel, renamed *Golden Hinde* by her commander, Francis Drake, returned three years later after one of the most extraordinary voyages of all time. This summer, meticulously reconstructed, *Golden Hinde* will again set sail toward the West.

So famous was *Golden Hinde* in the 1580s that she was preserved at Deptford on the Thames for the next 80 years. Yet not a single painting or sketch of her exists. Because of the political situation with Spain, Drake had to hand over his detailed log to Queen Elizabeth on his return. It has never been seen since.

It is not even known where or when *Pelican* was built. She could well have been a captured French prize. So when, almost 400 years later, two Californians, Albert Elledge, a San Francisco businessman with broad maritime interests, and Art Blum, a public relations consultant, decided to build an exact replica for a million dollars, they ran into difficulties. Another Californian, naval architect Christian Norgaard, set about the design with little to go on.

Chris Norgaard researched his designs over a three-year period from contemporary engravings, particularly those of the Flemish master, Pieter Bruegel the Elder. He studied accounts of the voyage; the most authentic was written by Drake's navigator, Nuno da Silva: "The *Capitana* [flagship] is in a great measure stout and strong. She has two sheathings, one as per-

Wide-angle view of gun deck shows solid oak beams, some nearly one foot deep, forming skeleton

for massive ribs and tough African iroko planking.
Gun deck headroom is only 4 feet 7 inches.

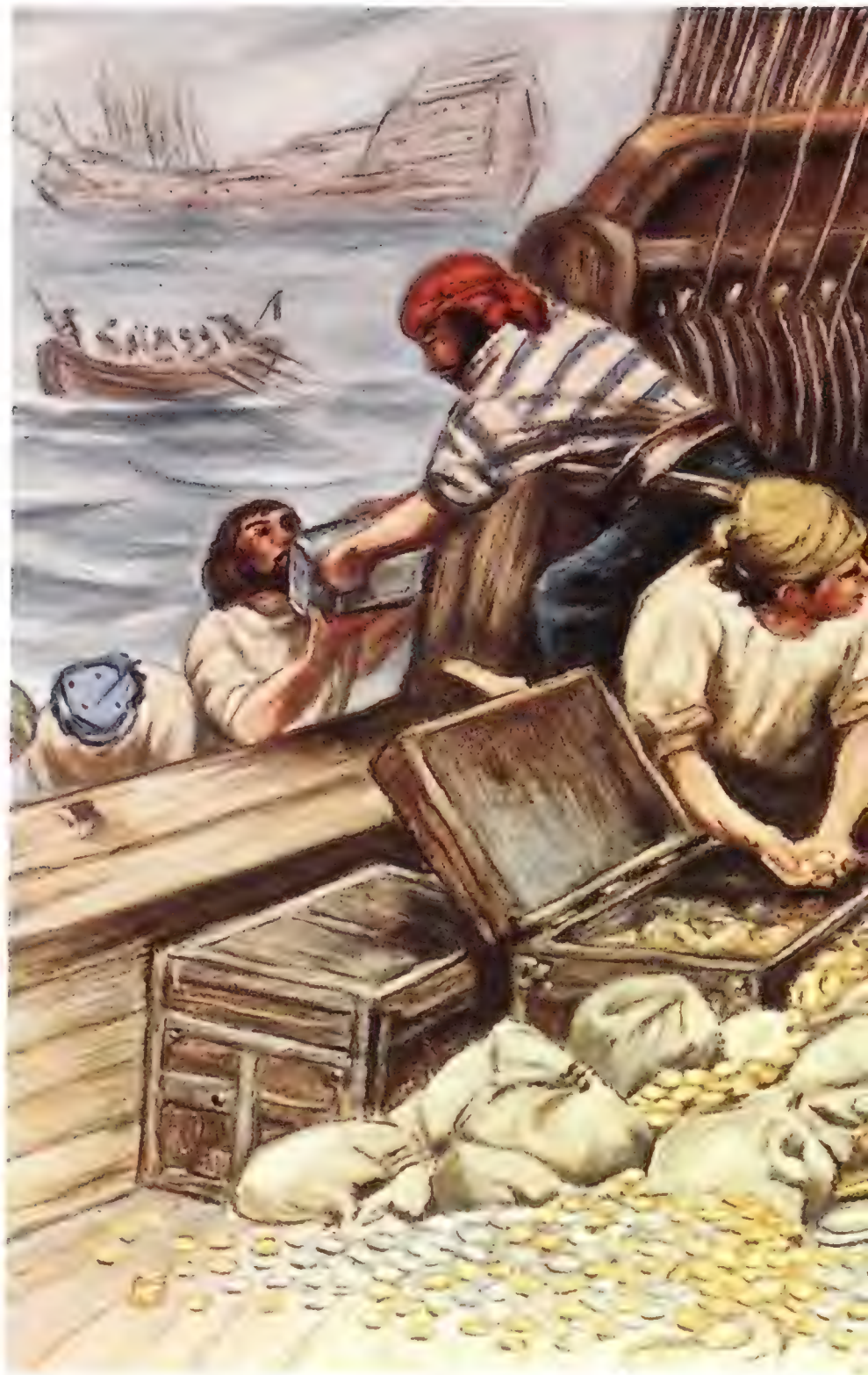
Painting depicts Drake's squadron of five ships putting to sea from Plymouth Sound in 1577.

fectly finished as the other. She is fit for warfare and is a ship of the French pattern, well fitted out and furnished with very good masts, tackle and double sails. She is a good sailor and the rudder governs her well. . . . She is water-fast when navigated with the wind astern and not violent, but when the sea is high she labours and leaks not a little. . . ."

Norgaard's research produced the plans of a mid-16th-century ship built along Venetian lines. Norgaard knows that early-16th-century English shipwrights often worked from the rule of thumb of a Venetian, one Bressan, who described a galleon as a ship whose breadth is one-third the length of the keel.

Once Norgaard's construction details were completed, someone had to be found to build the ship: craftsmen used to working in oak, making hemp rigging and sewing handwoven flaxen sails. A foundry had to make cannon and armor. Wood-carvers had to carry out the intricate ornamentation of the ship's Tudor furniture. Powder, shot and grog casks had to be made, also oil lanterns and leather buckets. Certain niceties had to be found: a copy of Fox's *Book of Martyrs,* for Drake was a zealous Protestant; a bottle of scented water which he was known to favor. Maps and charts of the period had to be discovered.

A replica of the 17th-century ketch *Non-Such* had recently been built at the quaint fishing port of Appledore, in north Devon, by Alan Hinks. A quiet-spoken man of 45, Hinks comes of a long line of shipwrights. His yard consists of a corrugated-iron shed linked to the sea by an oak-beamed slipway. To him went the job of building the new *Golden Hinde,* and he set



Treasure pours onto *Golden Hinde*'s deck during her voyage, while helpless Spanish ship wallows nearby.

about laying her 60-foot-long keel in September 1971.

Norgaard had estimated *Golden Hinde*'s dimensions from the known size of the berth at Deptford where the ship had been kept on view in the 1580s: 75 feet on the waterline; 102 feet overall (not including the bowsprit); maximum breadth 20 feet; extreme draft 13 feet. Her mainmast would be about 80 feet tall; foremast 71 feet; mizzenmast, 36½ feet.

The new *Golden Hinde* displaces 290 tons. Her afterhold contains a 19th-century innovation, the engine. Astern is the great cabin, complete with a beautifully carved oak table capable of seating ten people. A complete set of table silver engraved with Drake's

Royal approval rendered Drake a sort of licensed pirate—the epitome of the Elizabethan sea dog.

Old rigging tools used by the Bennet brothers include rigging screws (top center), marlin spikes and fids.

Elizabethan instruments will help navigate new *Golden Hinde*. Cross-staff predates sextant; so does astrolabe (top). Clockwise are astronomical sand-glass, lodestone, traverse board and dividers.

arms will grace her on her voyage. High above the great cabin is Drake's long, narrow cabin, the most uncomfortable part of the ship in a heavy sea.

Once the keel was laid, the sternpost and the stem section—two main timbers—were bolted on to it. Main beams throughout are English oak; elm was used for the keel, steel ballasted. Though shipwrights hacked out many structural features with old-fashioned adzes, chisels, gouges and augers, they often reverted to modern saws and electrical tools.

Elizabethans used pumice or dried shark skins for finishes, but Alan Hinks' men used the more modern sandpaper, and he had the problem of "trying to get

The Bennets, in their 70s, use old open-jawed rigging screws and handmade deadeye to set up stays.

the men to leave rough finishes on the timbers. They are used to leaving perfect finishes and this would not be in line with Elizabethan work." The Elizabethans used wrought iron where possible and so did Hinks.

Hinks found it impossible to find well-seasoned oak planks in lengths up to 40 feet. He settled for iroko, an African hardwood, for planking. The planks were fastened to the ribs with trunnels, actually treenails or wooden nails. The hull was readied for caulking to make it watertight. In Elizabethan days prisoners made oakum by picking old hemp ropes while caulkers sat around the prison yard with cloths over their knees teasing and pulling it out to the correct thickness. By means of a caulking mallet and a caulking iron (a broad-edged chisel), the oakum was driven between the planks and sealed with melted pitch. Masts were Norway pine—not easy to find straight and knot-free.

On April 5, 1973, the launching was ceremoniously carried out by the Duchess of Devonshire. She smashed a bottle of mead across the bows, and *Golden Hinde* slid gracefully down the slipway into the placid waters of the little harbor. The firing of her four cannon shattered the peaceful scene. The three masts were then stepped, and the two old Bennet brothers began the skilled task of rigging. Oswald Bennet (77) climbed nimbly up the ratlines and spent most of his eight-hour day aloft. His younger brother, Joe (73), preferred to direct the operation from atop the fo'c'sle. Hinks' craftsmen had hand-carved all the deadeyes for making fast the shrouds while specially prepared hemp was used throughout for halyards and sheets, passing through hand-carved blocks. The rigging is heavier than on later ships, where better designed blocks greatly reduced the size and weight.

With most of the crew now aboard, the job of fitting out proceeded quickly. Captain Adrian Small insisted that every member of the crew must be adept at rigging. Only by actually working on the original rigging would they be proficient at sea. Many hands helped with fashioning blocks and splicing lines.

Elizabethan ships were highly colored and gaily painted. Designers hoped that if a ship looked good, it *was* good. They added to *Golden Hinde* the figurehead of a gilded hind's head, a *hinde passant Or*. This was the crest of Sir Christopher Hatton, one of Drake's chief backers. The present color scheme of the vessel is taken from the arms of Hatton. The only other carvings on the replica are two knight's heads on the main deck, below the quarterdeck, and a gilded lion mounted on top of the rudder post.

The replica has been fitted with 14 Culverin-type cannon, the long-range armament of the period, as fully operational as were Drake's. On board are muskets of the period, including matchlock Calivers, Petronels, an arquebus and sets of armor and helmets.

Francis Drake, epitome of the Elizabethan sea dog, went to sea as a boy and soon became master of it. On a slave-running trip to the West Indies with John Hawkins, 300 men out of the original complement of 400 failed to return to England, due mainly to scurvy and dysentery. This left an indelible mark on Drake that served him when he planned his own famous voyage. The ship was kept clean and he always sought fresh food for his crew.

Little is known of Drake's early youth—not even his date of birth. It was around 1543. He died in his middle fifties in 1596. In 1577 he was described as be-

Terence Spencer's photographs have illustrated many SMITHSONIAN *articles, most recently a story about pheasants in the June 1974 issue.*

Under way, hands scramble aloft to furl a sail. Recruiters sought men who had sailed square-riggers.

Captain Adrian Small, left, studies old chart with second mate Godfrey Wicksteed, square-rigger veteran.

ing small in stature and thickset. He wore a jutting beard that failed to hide his ruddy, weather-beaten skin. He was dignified and courteous and by then had made friends in high places and close to the Queen. When he left Plymouth that November, he had one of the best-equipped expeditions ever to sail from England. Next day he put into Falmouth, where his flagship, *Pelican,* lost her mainmast in a Channel storm. It took only ten days to refit her, so plentiful were tall trees back then.

On December 13, 1577, he set sail once again in company with four other smaller ships, one of only 15 tons. He had with him a total complement of at least 160 men. Aboard the largest ships he carried pinnaces for raiding parties. *Pelican* was small even for her day. Her crew of 80 included 40 men-at-arms, an apothecary, a shoemaker, a tailor, Drake's personal trumpeter and his chaplain, Francis Fletcher. There were also nine "gentlemen" aboard, for fun and profit.

The fleet sailed down the west coast of Africa. At the Cape Verde islands, Drake captured one of his most important prizes, not just a ship, but a brilliant Portuguese navigator, Nuno da Silva, who knew his way through the Strait of Magellan and into the Pacific. Throughout his circumnavigation, Drake relied on captured Portuguese and Spanish pilots.

A slow, tedious two months took the fleet across to Brazil. Then it met dirty weather, remained two weeks in the Río de la Plata and then sailed south to San Julián, where Drake abandoned two ships. Here also, Drake executed Thomas Doughty, one of the gentlemen, for treachery and betrayal. He invited Doughty to dine with him in the great cabin the night before.

In August 1578 Drake, in company with *Elizabeth* and *Marigold,* sailed southward once again and entered the Strait of Magellan. He renamed his flagship *Golden Hinde,* and with Nuno da Silva and reasonably fair weather on his side, threaded the Strait and its many uncharted rocks and islands, then steered northwest until they ran into a gale that lasted a full three weeks.

Judging from the replica—narrow-beamed, round-bottomed and high-sided, life must have been beyond description in that storm. Of the 90 men aboard, 80 were huddled below in pitch darkness on the gun deck and in the holds. A few privileged mariners might have had oil lanterns. Head clearance was 4 feet 7 inches—they lived permanently stooped. Some of the men had hammocks, but excessive rolling meant that they hit the side of the ship with every roll. The remainder of the crew and the men-at-arms lay on deck between the cannon, with the sea often sloshing over them, through hawseholes and gun ports. The cold in these southern latitudes is intense. With the ship corkscrewing wildly, cooking on coal braziers would have been nearly impossible.

Storm-driven, *Marigold* foundered, *Elizabeth* headed back to England and *Golden Hinde* alone remained to harass the Spaniards off Chile and Peru, probe to the north as far, possibly, as Vancouver, nail a brass plate (lately discovered) "upon a fair great post" in San Francisco and claim the land for Queen Elizabeth, cross the Pacific and Indian Oceans, and make it proudly back to Plymouth on September 26, 1580. In her hold she carried silver and gold bullion worth $50 million at today's valuation. Elizabeth later knighted Drake aboard *Golden Hinde,* signifying her approval of "the master thief of the unknown

world" and possibly giving rise to the old English saying: "Steal £1 and you go to gaol for it; steal £1,000,000 and you get knighted."

The 20th-century replica of *Golden Hinde* started less auspiciously. About to set off on her sea trials, she weighed anchor, but proved a bit "tender" for modern standards. Ballast was added which steadied her, but made her ride sluggishly low.

She was in no state to sail the Atlantic when I joined her on the Thames as a member of the starboard watch. I had a hammock on the gun deck directly above a secured cannon. Beneath my hammock was a rough wooden chest for my kit. I had been warned to raise this chest well off the deck as the gun deck was likely to get flooded.

A northerly freshened during our first night out as we made our way around the Kentish coast. Captain Small was having a problem: The two compasses did not tally. He realized he was sailing near Goodwin Sands on an ebbing tide as the wind gusted to force eight—gale strength. The ship corkscrewed madly, leaping over the crest of a wave, yawing 30 degrees off course and crashing into the trough on the other side. The helmsman fought desperately, spinning the wheel in a futile attempt to correct the yaw. Some of the crew were violently seasick. Captain Small and his first mate spent most of the night on the wet, windswept quarterdeck shouting orders to the helmsman: "Up helm 10 degrees!" The helmsman would repeat the order in the howling gale; the fo'c'sle lookout would report on Channel shipping. Meanwhile, the American cook, John Junus, gallantly produced a delectable turkey.

After my four-hour watch I made my way down the pitching companionway to the dark gun deck below. The smell of newly treated hemp ropes permeated the darkness. The sea was swirling a foot deep under my hammock and splashing against the guns. In my hammock, like Drake's men, I spent the next four hours hitting the ship's ribs every time we lurched to starboard. I was too tired to worry.

Dawn brought clearer weather, though the wind continued to blow at 25 knots. I joined Captain Small on the quarterdeck. "A rough night," he volunteered, "not helped by this wretched ballast we are carrying. We are riding too low and shipping too much water." He added that we should be making six or seven knots instead of a miserable three and a half, that we were yawing badly and that over Goodwin Sands, we only had to touch bottom and over we would have gone.

The running gear on *Golden Hinde* is antiquated and there is a lot of it for the size of the ship. It is cumbersome and awkwardly led. Tackle has been greatly refined over the years. I heard the booming voice of the Master yell, "Ready about!" The crew prepared the sheets. Small spoke to the helmsman: "Keep her full for stays." When the ship had gained sufficient speed to go through the eye of the wind without stopping and after the crew had reported, "everything ready, Sir," the master ordered the helmsman, "down helm!" Up came the ship into the wind and the helmsman shouted, "helm hard alee." At that the men let go the fore and head sheets, eased the spritsail and foresail sheets and at the same time hauled aft the sheet of the mizzen. Once on the other tack, the sails began to fill again—and the Captain ordered, "mainsail haul" and "steady helm." We were learning.

Golden Hinde is scheduled to cross the Atlantic in October. *Mayflower*'s replica took 53 days; 60 days are being estimated for *Golden Hinde*. The ship will be loaded with much the same food as Drake carried: two barrels each of salted pork and salted beef, corned beef, dried codfish, dried split beans and lentils, prunes, currants, dried milk and eggs in water glass.

Out of 180 volunteers, Adrian Small chose 15 for his crew—English, American and Canadian—preferably veterans of *Mayflower* and *Non-Such*. It was essential that most could go aloft in bad weather.

The plan is to cross the Atlantic by way of the Canaries and over to Panama with the trade winds. Lloyd's are not keen for *Golden Hinde* to round the Horn, nor are most of her crew, so she will go through the Panama Canal. In the Pacific she will pick up the trades again which should carry her to Hawaii. She should make San Francisco 120 days after Panama and be laid up at Fisherman's Wharf as a museum, with Chris Norgaard in charge.

Vessel's transom bears *hinde passant Or,* coat of arms of Drake's backer, Sir Christopher Hatton. Motto reads: "Virtue is the strongest armor."

PISSIMA
VIRTVS

A huge antenna gets a face-lift

Designed to last only ten years, the 1,000-foot dish at Arecibo is being resurfaced to give scientists a more sensitive ear on the universe

Medieval theologians longed to poke their heads through the inverted bowl of the night sky to find heaven. They never quite made it, but the workmen poking their heads through the bowl above are making it possible for man to study the ends of the universe.

The bowl in these pictures by Barrett Gallagher is the radio telescope at Arecibo in the hills of western Puerto Rico, operated by Cornell University for the National Science Foundation. It is an ear to the universe, delicate enough to discriminate the metronomic ticking of pulsars, sensitive enough to detect signals from objects so far away that they are almost at the beginning of time. It can "see" at radio wavelengths to the center of our galaxy, forever obscured to our eyes and cameras by clouds of dust.

Why all the fuss over a scientific instrument that has been in place and working for a decade? The Arecibo dish must rate as an all-time best buy among the ex-

Workmen put the finishing touches on the new dish at the Arecibo radio telescope in Puerto Rico, left. Radio waves are focused on the structure over the bowl, above, where they are amplified. Inside the bowl workers wear special footgear to avoid distorting the precise curve of the delicate panels.

pensive hardware of big science. It was built (and is still used) to probe the ionosphere of our own planet, as well as to receive radio signals from deep space and to send radar beeps to the planets and back.

Now, for $8 million, the dish is being reshaped for greater accuracy with perforated panels (the holes let rain fall through, and transmit sunlight to the plants below that prevent erosion of the natural bowl in the hills). With a more perfect curve, the telescope will be able to work at shorter wavelengths, which means better resolution. The new dish will be able to locate more accurately a radio source in space, so the optical astronomers have a better chance of finding it, and can resolve detail in radio sources, such as the complex structure of our own galactic center. Renovation will be finished this year; one of the first tasks for the improved instrument will be radar mapping of Venus when that planet swings close to us in 1975.

CAT

By David Snell

The new hunger for coal brings a boom to Wyoming's Sweetwater County

Left for dead when the last coal mine closed in the 1950s, this land of sheepherding and hunting is cashing in on its mineral riches

At 4:30 P.M. Mountain Daylight Time, the siren at the Jim Bridger Steam Electric Project blasts the day shift right out of there with a fearsome howl, and sheepherders off in the treeless hills will tell you that it is sometimes answered soulfully by coyotes so far away that they'd have to slink up the highest buttes just to see the tops of the 500-foot-tall chimneys.

The Jim Bridger Project, now under construction, is a joint venture of the Idaho Power Company and the Pacific Power & Light Company. It is situated way the hell and gone out there in Sweetwater County, which spreads over 10,429 square miles of southwestern Wyoming and which, for all its apparent emptiness, is caught up in an astonishingly diversified economic boom.

To out-of-staters, Wyoming has long been renowned as a place to send picture postcards from, but now America is discovering something else about Wyoming which geologists have known all along. Beneath all that scenic splendor, the state is solid pay dirt.

Sweetwater County, for example, according to the Rock Springs Chamber of Commerce, is 98 percent underlaid with coal—good clean-burning, low-sulfur, low-ash stuff of mostly sub-bituminous quality. Close to half of it, amounting to some five billion tons, is considered to be minable, a comforting thought in times of an energy crunch. Along with the coal are stores of other energy sources: oil, natural gas, uranium, oil shale.

Sweetwater County has known good times before, and bad times in between. All that coal was the main reason the Union Pacific Railroad charted its route through southern Wyoming and Sweetwater County in its race toward the golden-spike linkup with the Central Pacific at Promontory Point, Utah, in 1869. For scores of years, Wyoming mines fueled the trains and were pretty much the sole support of Sweetwater County's economy.

In 1883, seven years before statehood, Wyoming's first producing oil well was brought in; by the turn of the century Casper had a field, and eventually oil supplanted coal as the leading mineral product of the state. In the early 1960s oil and natural gas became Wyoming's prime industry, bringing in as much revenue as tourism and farming-ranching combined.

Poor old Sweetwater County! During the 1950s, Union Pacific completed its switch to diesel locomotives and shut down its major mine at Rock Springs. Other coal mines in the area followed suit. For most of the country these were years of boom and abundance, but Sweetwater became the Western outpost of Appalachia. There was very real concern that Rock Springs and neighboring Green River, the county seat, would become ghost towns.

But another disappointment yielded unexpected and highly profitable results. In 1937 the Mountain Fuel Supply Company drilled an exploratory well 20 miles west of Green River. It found no oil or gas, but the company's chief geologist was curious about the unfamiliar pure white substance which *was* extracted.

This, it turned out, was trona, a vast solidified lake of it 1,500 feet below the sagebrush-covered prairie,

It's 4:30 and some of the 2,400 workers building the Jim Bridger power plant are homeward bound.

Photographs by Yale Joel

the first solid body of the substance ever discovered. From trona a fine quality of soda ash is refined, to be used in the manufacture of a great variety of products including glass, paper, detergents, textile dyes, photographic film, nonferrous metals such as aluminum, and that old standby of sufferers from acid indigestion, bicarbonate of soda. The first trona mine in Sweetwater County was opened in 1947, and by the 1950s trona mining was able to absorb most of the county's displaced coal miners.

Meanwhile, oil companies were drilling deeper: In the important new Brady Field discovery southeast of Rock Springs, wells go down to 16,497 feet, where 100 million barrels or more of recoverable oil may exist.

And then there is the Jim Bridger Project. By the time its planned four power-plant units become fully operational in 1978, its estimated cost will be close to $900 million. Drawing upon its own 14-mile-long coalfield, which it will work as an open-pit mine, the plant will eat up coal at the peak-load rate of about 16 tons per minute to produce two million kilowatts of electric energy for Western power grids.

All things considered, it is easy to see why conditioned reflexes in Sweetwater County tend to become intensely fiscal. There *is* an environmentalists' suit pending against the Jim Bridger Project because of the future air pollution it does not expect to create, but it's way off in some other jurisdiction, Cheyenne, maybe, or Denver. To all intents and purposes there is no environmental movement in Sweetwater County, at least not in that organized gnat-swarm sense in which industry views such things. Nobody is giving it all that much thought.

To the electric companies' credit, they plan to go to exquisite pains to stay in harmony with nature. Environmental precautions and measures account for 20 percent of the cost of the plant. Topsoil stripped away for the open-pit coal mining will be put back in place and contoured, with careful restoration of the native arid grasses. The chimneys will be fitted with electrostatic precipitators designed to remove 99.3 percent of the particulate matter from the exhaust.

Still, when the siren blows, birds take flight and coyotes feel a certain sense of longing, and perhaps loss. But no such thoughts crowd in on the 2,400 construction workers employed by the project, nor on any bankers, businessmen or civic boosters who happen to be within distant earshot. On payday that siren says "Here goes another $700,000-plus weekly payroll right into the local economy." In that context it is the sweetest music this side of Guy Lombardo.

Not everyone hears it that way.

Debbie Vase is considering an offer to stay on at Jim Bridger to drive a 120-ton coal rig.

"Right here," says Victor Magagna, squinting through his surveyor's transit across the Union Pacific tracks in Green River, "right here is where the overpass is coming through. Well, I'm 59 years old and I've worked for the Highway Department for 31 years and I've seen it all. You bring in all these new people and pretty soon you don't have no more hunting, no more fishing. That's the bad part of it. Like here on this river there's German brown and then up north of Rock Springs there's rainbow. And we have deer and elk and antelope. But after all these people come in there won't be much of all that.

"Now I'll tell you the other bad part. These people, they come in here, like at Bridger, and they make good pay and run the prices up on everyone. Why, some of those day laborers get $40 a day—$40, for unskilled labor, mind you. That's common labor. I don't know *what* those skilled people are getting. I've heard of kids that drop out of school and go out to Bridger and get twice what their teachers get. Well, there is going to be a lot more of that sort of thing going on because this is a boom. I hear Union Pacific, they're going to mine a million tons of coal a year and sell it to those plants that are making cement."

In the 1970 census, Sweetwater County's population was 18,391. Now it is up around 45,000 and still growing, judging from the entreaties, threats and cajolery heaped daily on the service-applied-for department of the phone company.

Devilment and nerve strain are up proportionately. Complaints filed with the county sheriff's office in 1973 were 60 percent higher than in the previous year. Sheriff John Zakovich says that most of the disturbances occur at night and involve family disputes. Last year the county attorney's office in Green River prosecuted 300 cases, twice the number in 1972. The State Highway Patrol reported 32 traffic fatalities in the county, which likewise was twice the 1972 figure.

Since 1970 the Rock Springs population rise has kept pace with the county's, leaping from 12,000 to more than 26,000. Like a lot of people in Rock Springs, Mrs. Dolores Hornsby, who teaches sixth grade at the Roosevelt Elementary School, is concerned about the growing crime rate.

"We used to feel free to go away and leave our houses wide open," she says. "But now there's so much thievery going on that you don't dare leave a blessed thing in your home unless you lock up. Right now in

*Houston-based David Snell writes about Texas (*SMITHSONIAN, *June 1974) and about people, such as artists, naturalists and rare stamp dealers.*

A construction workers' trailer camp offers few amenities, but no one expects to stay long.

Mexican-American Jake Chavez herds sheep, a job once almost exclusively reserved for Basques.

this neighborhood we've got a Peeping Tom and last year we had a rape case. We never had *that* before."

Rock Springs has always had a fair degree of success as a cultural melting pot. Its population is said to represent more than 60 ethnic infusions. Today the quality of life in Rock Springs, such as it is, is enjoyed by a small but prosperous Chinese community whose business enterprises include two Chinese restaurants. One of these, the Renegade Cafe, is situated just down the street from the Outlaw Inn Motel at the junction of Highway 187 and Interstate 80.

On the average working day, until about 5 A.M., the breakfast crowd at the Renegade is largely made up of long-haul truckers. Just before six o'clock the place starts to fill with hard-hats. Mostly they stick to standard breakfast fare and get coffee fill-ups for their vacuum bottles.

One recent morning, however, three construction workers employed at the Jim Bridger Project ordered the works—egg rolls, diced chicken with almonds, sweet-and-pungent pork and fried rice. To top off the early-morning celestial feast, they ordered fortune cookies. "Woo-EE!" said one, "Looky what mine says!"

He read aloud: " 'The great fault in women is to desire to be like men.' "

"Uh-oh," said a companion. "I speck you better not show that to Debbie Vase!"

The chauvinism of the Chinese fortune cookie would be lost on the young woman to whom he referred. Debbie Vase's mind runs famously to larger things.

Debbie, who is 23, is the outdoorsy daughter of Mike Vase who runs the Outlaw Inn next door. She has achieved local celebrity as a truck driver out at the Jim Bridger Project (see p. 74). She hired on last year and since then, to the delight of male peers who call her "Calamity," has been moving the biggest rigs on the job.

Chavez' sheep move under a Bridger power line; the pylons were set in place by helicopter.

"You ought to see her handle a ready-mix truck," says Kenneth W. Worrall, the project's construction auditor. "She can back that thing a country mile."

Debbie Vase already has been promised a permanent job at Jim Bridger if she wants it. Dean James, the Kentucky-born mining superintendent at the project, has offered to let her stay on to drive one of the ten huge coal haulers which will make the three-mile shuttle run between the mine and the plant. These monsters weigh 40 tons each and have a load capacity of 120 tons.

The other day Debbie climbed into the cockpit of one of them to get the feel of it. Though she did not rev up the 700-horsepower diesel engine, she could sense its surge and what it would be like to have those ten big wheels with their $25,000 worth of rubber turning to her touch. She admitted she was tempted.

But a struggle is taking place within Debbie Vase. It is the struggle between the frontier Wyoming which still exists and the booming new enterprises which are

so swiftly and irreversibly changing it. For several years before she went to work at Bridger, Debbie had earned top dollar during hunting seasons by guiding wealthy sportsmen, mainly from the East, to where the deer and the antelope play. Within Sweetwater County's 10,429 square miles there is scarcely a plain or contour that is not as familiar to Debbie as, well, the instrument panel of a ready-mix truck.

Sometimes, far out there on some scrubby slope against a snow-crowned butte, she would see a green Ford pickup truck thumping along a dirt trail. She'd know it was Sam Megeath, an unsalaried deputy sheriff who is employed by the Rock Springs Grazing Association as a ranger.

All the local folks know Ranger Sam. It is his job to prowl the million or so acres owned or leased by the association. He keeps logs on the weather and water runoff, on the condition of the many strains of grass and forage that grow in the region, on the depredations of coyotes, and on the migrations of the association members' sheep herds which move across the winter grazing lands and then in the springtime converge on Rock Springs where they go into the lambing sheds.

" 'Lo, Debbie," Sam would say, pulling up in the pickup. "How's my girl?"

"What say, Sam? Behaving yourself?"

"Might as well, at my age."

Then they'd go their separate ways, each sensing the other's love of an unspoiled world and perhaps the other's awareness of its impermanence.

For Sam Megeath, who is 68, some things do not change, like the coyotes and the huge "Popeye" snowbank which reappears every winter on the north face of the mountain below Rock Springs. He first noticed its resemblance to the cartoon character many years ago. Sam feels sorry for unimaginative or preoccupied people who hustle in and out of the Rock Springs airport and never notice Popeye. "Well," he says, whenever he takes someone out to the south range, "there's ol' Popeye, puffin' on his pipe."

A toxic weed intrudes

Some things do change, and Sam never fails to notice. He believes in progress and all that, and thinks it's good for the country. But one thing he has observed, and been disturbed by, is what happens to the terrain when a pipeline or road comes through.

For some reason, even though the crews are usually very careful to put back the topsoil and reseed along the roadside or on top of the pipeline, something about the disruption triggers rapid growth by a low scraggly grass called *Halogeton*. This is a vegetation which some blamed fool of a Russian brought to this country from Siberia, Sam will tell you. Normally it

A dragline clears dirt from atop a coal seam. When the coal is gone, the soil will be replaced.

is subdued by other grasses. But as soon as you scuff up the ground it takes off like a bunch of angry ants. *Halogeton* is toxic to sheep because of its high oxalate content, but they will eat it if they are hungry; if they eat too much they die.

And there's something else—not a bad thing, just different and indicative of the changes that are taking place. There have always been a few Mexicans who drift up from the Southwest and hire on as herders. Of late, the number has been increasing. What's happening is that some of the Basque sheepherders brought in from Europe are failing to sign up again after working out their three-year contracts. They go into the trona mines or take jobs at Jim Bridger and knock down $8 an hour.

Mexicans or Basques, it is all the same to Sam Megeath. No matter who's running a sheep camp, he loves to drop in for a visit, especially on a cold gray day when a front is moving in and the sheep are starting to bunch. Sam is always welcomed warmly. Even though he speaks no Basque or Spanish, coffee and the coal burning in the cookstove make for mighty good communicatin'. All the stewing and hustle down in town seem far, far away.

In town, some of the bustle is the boom itself and some is the effort to channel it. L. W. (Jack) Jones wears two hats. He is executive director of the Rock Springs Chamber of Commerce and also a representative in the Wyoming State Legislature. The two roles give him a special understanding of the anatomy of a boom, as well as a certain ambivalence about the one at hand.

The difficulty, he says, is that you cannot just call in the architects and say, Lo, let there be a boom, and

then lay it out all neat and pretty. Planning and implementing take money, and you don't have your tax base until industry and the franchised fried-chicken stands and all the rest of it have already set up shop. As things work out, there is usually about a three-year lag between the need for a program and the tax revenue that could have implemented it. In boom situations the cart invariably arrives before the horse.

There *used* to be a symphony orchestra in Rock Springs. But that was a long time ago and nobody is quite sure what happened to it. The school district which includes the city has what is considered a very good music program, and the high school marching bands put on stirring half-time shows at football games. The music program runs mainly to brass, percussion and reeds. Next year the people in charge hope to do something about strings.

That is sort of the way things go when there's a boom on. The trumpets and drums come on strong. Then by and by somebody brings in the violins.

In Rock Springs, for instance, more than a dozen women's clubs have pledged fullest cooperation to the City Cleanup and Beautification Committee. Its chairperson is Dorothy Worrall, wife of Kenneth W. Worrall out at the Jim Bridger Project. The committee has all sorts of projects in mind, such as massive tree plantings and the creation of neighborhood parks. "What we are going to try to do," says Mrs. Worrall, "is turn a boom town into a bloom town."

Meanwhile, come Saturday night, Archie Hay Post No. 24 of the American Legion opens its hall in Rock Springs to the public for the big weekly bingo game. The proceeds go to such things as Boys' State and the Legion's oratorical contest.

No matter if the temperature outside is scorching or way below zero. The hall is always jam-packed. On Saturday night it is the only game in town.

Saturday night bingo changes the pace a bit, but rising energy demand means the boom is here to stay. The next article (p. 80) gives a view from the top of how much energy we will need and where we'll get it.

By Russell W. Peterson

Nation's chief environmental adviser offers a long-range plan for energy

How much energy will the United States really need in the year 2000? How can we produce it with minimal damage to the environment?

Some people still think the shortage of energy last winter was a fluke, but in truth it was the public's first exposure to a problem which will dominate our national life until the end of the century and beyond. Major choices must be made about our energy future, and each of us—as voters, consumers, employees, home owners—has a stake in and some influence over future energy policy.

The most important aspect of that policy is the goals we decide to work toward. At the Council on Environmental Quality (CEQ) we have developed a set of goals which we call the Half and Half Plan—a specific and manageable program of energy conservation and production, geared to energy needs *and* environmental needs. Like all plans, it involves numbers, graphs and projections. But implicit in the numbers and curves—at the heart of the plan—are the really important things: human needs, individual life-styles and basic values.

To begin with, there is the question of whether our nation should seek to become self-sufficient in energy—dependent largely upon our own resources. Some believe such independence is neither desirable nor practical. I believe it is both.

The United States, with six percent of the world's population, consumes about a third of the world's energy. In the rest of the world, hundreds of millions of people are living on less than $100 a year. Many nations are trapped by an explosion in their population which nullifies efforts to improve their level of economic well-being. Historically, population growth has slackened as per capita income has increased. But to accomplish economic growth requires raising the use of energy. For this reason, if for no others, the United States has an obligation to plan its energy future so that energy supplies outside the United States can be devoted to improving the quality of life elsewhere around the globe.

To rely primarily on our energy resources, however, does not mean that the economy must squeal to a painful halt or that our comfort and convenience must decrease. Energy use will continue to grow. But the question is: How much? What will our society's energy demands be in the year 2000?

Traditionally, future energy demands have been calculated by projecting current growth rates in consumption. From 1965 to 1970, energy use per capita grew at a rate of more than three percent a year. In 1972, the Department of Interior began with that and projected a total of 192 quadrillion BTUs (British Thermal Units) of energy in the year 2000, more than two-and-one-half times present consumption. (A quadrillion is a million billion; in the jargon, it is often shortened to "quad.") This projection was an excellent technical effort, and was representative of a number of "high-range" forecasts of that period. But the oil embargo changed our perspective. That amount of energy production is simply out of the question without unacceptable dependence on foreign sources or unacceptable damage to our environment.

What must be understood is that the advertisements which read "A nation which runs on oil cannot afford to run short" should have read "A nation which runs on oil is certain to run short." Seventy-five percent of the U.S. energy today comes from petroleum and natural gas. But 1970 was the peak year for domestic petroleum production; oil from Alaska and the outer continental shelf will merely slow the decline in what is available to us. And natural gas supplies are ex-

pected to reach their peak shortly. From here on out, domestic oil and gas production will be declining at the same time that our energy needs will be increasing. Hence, to more than double energy consumption while using only our domestic resources would require us to quadruple or quintuple present coal production in the United States, and to increase nuclear power from less than one quad today to as much as 60 to 80 quads by the year 2000.

Even if we *could*, we do not want to do that. The production and use of energy is the single most important cause of environmental degradation—all the way from the devastation of lands by surface mining and the hazards of deep mining to oil spills, sulfur emissions and other pollution of air and water. To consume 192 quads in the year 2000 would put terrible strains on the environment.

So for many reasons we need a lower goal for total energy consumed. The Half and Half Plan represents that—a target of 121 quadrillion BTUs instead of 192 (see graphs pp. 82, 83). We at CEQ believe this is a more desirable goal for the United States.

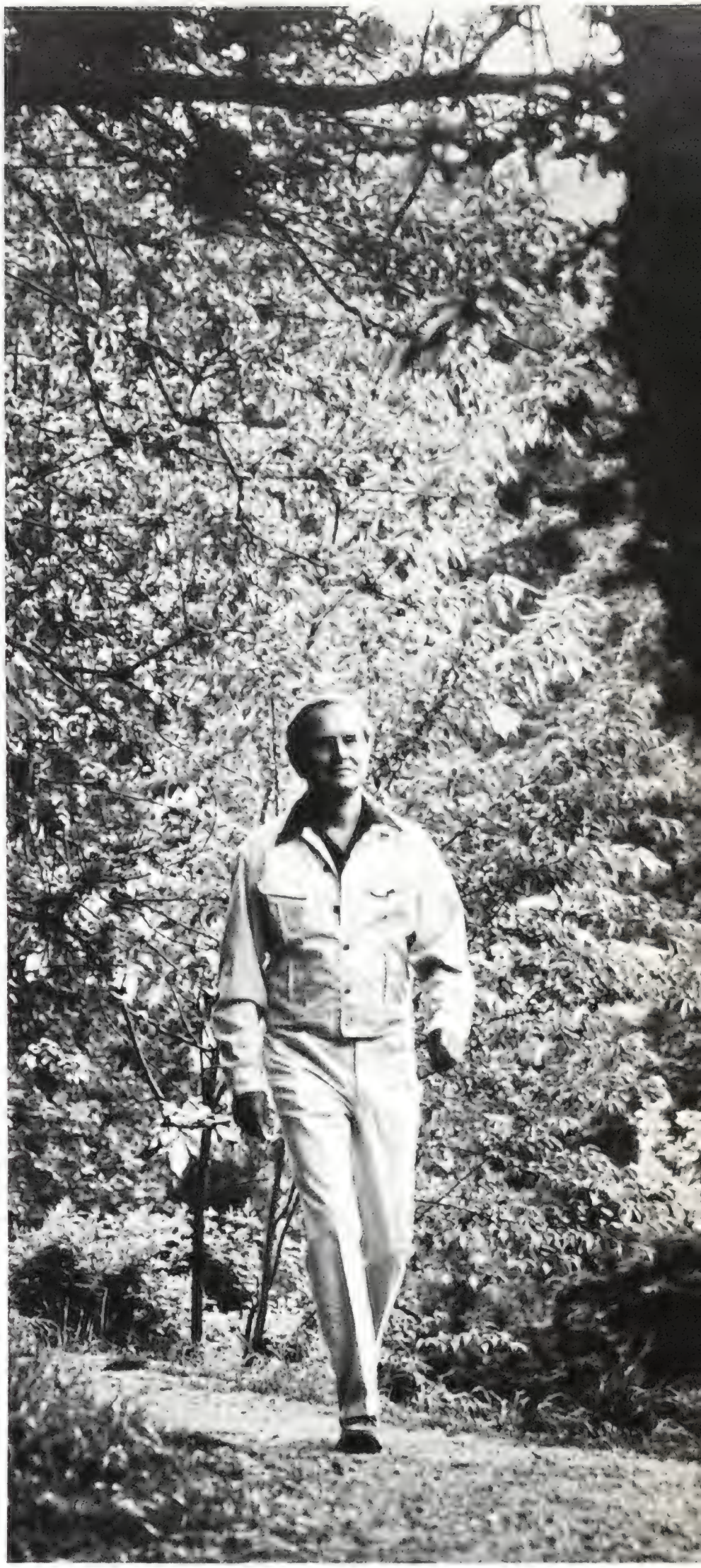
Half growth, half conservation

The Half and Half Plan grew out of analyses of the growth in per capita energy consumption since 1947, not just during the last few years. Over the longer period the rate of growth in energy consumption per capita averaged 1.4 percent. That is lower than the recent three percent rate, but it supported, over the period, a great growth in national affluence.

Furthermore, the Half and Half Plan assumes that one-half of this growth in energy consumption per capita can be achieved through energy conservation—through reallocation from wasteful uses to ones which meet important human needs. To paraphrase Benjamin Franklin, a BTU saved is a BTU earned. Each BTU saved for one purpose means one more that can be put to wise use somewhere else. In a nation that has been profligate in using energy, there is plenty of room for relatively painless conservation.

I believe the United States should make it a major national objective to make energy savings of 0.7 percent each year. By the year 2000, conserving at that rate will reduce gross energy inputs by 27 quadrillion BTUs, more than one-third of our present energy consumption. By making such savings, only 0.7 percent of the overall growth rate of 1.4 percent must be provided through additional production of energy. Half conservation and half growth—hence, the Half and Half Plan.

The energy savings can be achieved by means with which readers of SMITHSONIAN are familiar: better insulation and more energy-conscious architectural



Formerly the governor of Delaware and, before that, a DuPont executive, Dr. Peterson is now chairman of the President's Council on Environmental Quality.

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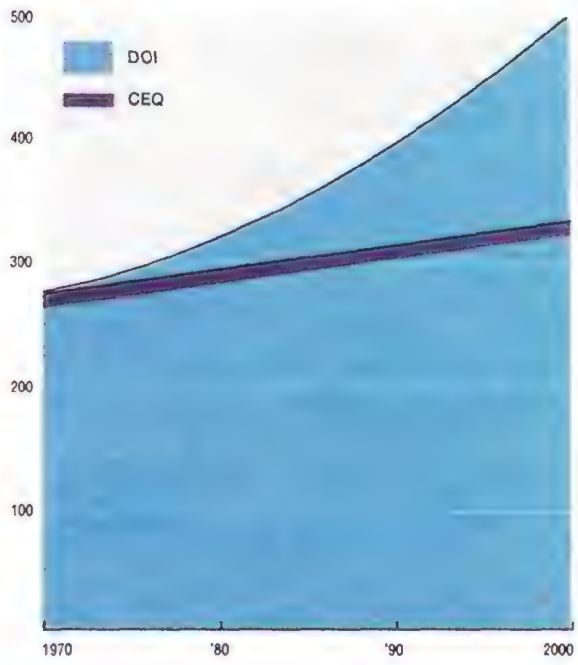
DIVISION OF BEVIS INDUSTRIES, INC.

The Half and Half plan

design in residential and commercial buildings; personal efforts to reduce household energy use; more efficient appliances; more recycling of materials; better land use; more energy-conscious design of industrial processes; and, most important of all, a more efficient transportation system.

At CEQ we have looked particularly closely at the transportation sector and think it would be possible to provide all needed transportation services in the year 2000 with 21.6 quads, a small increase above the 17.0 quads we use today. Some may feel this is heretical (the Department of the Interior, for example, projected 42.7 quads, nearly twice as much), but we think it could be done.

NET ENERGY CONSUMPTION PER CAPITA
(In Millions of BTUs)



Interior Department projection showed per capita energy use would rise by 2.5 percent; CEQ calls for only 0.7 percent.

Improved mass transit would be an important factor, but the major change would come through smaller, more efficient cars (see p. 85). It is obvious that a car that gets twice as many miles per gallon uses half as much gas. (It also cuts air pollution.) If, over the next decade, we adopt a new ethic about what constitutes a desirable automobile, we can provide for universal auto ownership in the year 2000 and still consume little more gasoline than we do now.

Of course, many Americans have deep-seated feelings about cars; many still believe a big car is an important sign of success. A few months ago I went to a meeting at the State Department. All sorts of dignitaries pulled up in front of the building in limousines, but when I arrived in CEQ's Pinto, we were waved away by the doorman. Clearly a member of the establishment would not be found in such a car! I had to park a few blocks away and walk to the meeting. The point is that we are going to have to change our attitudes about some things. But we've done it before. People were delighted with the black Model T before color, fins, accessories and yearly model changes appeared.

Hope from new technology

Even if such conservation is achieved, even if half of our 1.4 percent growth rate is accomplished by energy saving, a great deal of energy will still need to be produced. The question is: How can it be done in the face of dwindling supplies of oil and natural gas?

Many people have high hopes for new technologies such as solar energy, geothermal energy and nuclear fusion. I support an aggressive pursuit of these technologies, but it takes wishful thinking to expect that more than three percent of our total energy will come from such sources by the year 2000.

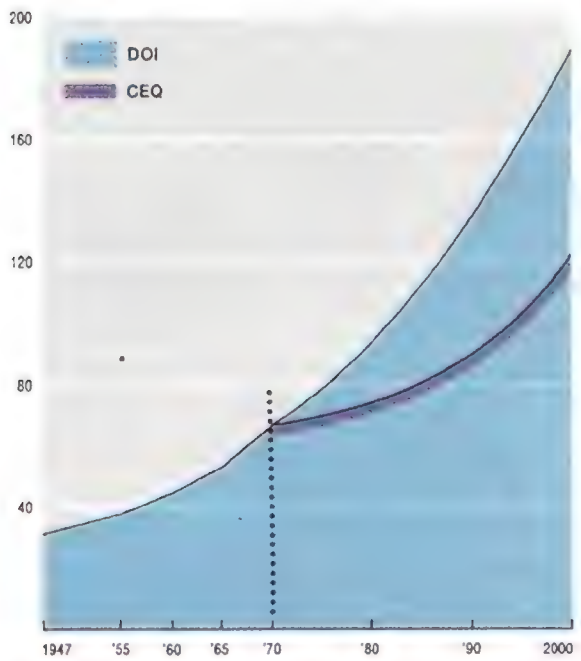
Nuclear fusion as a source of energy still faces many unknowns. Even with major breakthroughs in fusion research (and these are by no means certain to occur), we cannot expect any significant production from commercial fusion power plants by the year 2000.

Solar energy is now quite properly being pushed very hard. Its main application will be to heat and cool buildings. But solar energy will be used almost exclusively on new buildings—few old ones

will be retrofitted—and it will be of limited use in the high-density urban dwellings which constitute a steadily larger percentage of new home construction. Once you do the arithmetic, you have to conclude that solar energy appears unlikely to contribute more than one percent of our energy in the year 2000.

The story is similar for geothermal energy, for it can supply no more than two percent of our electricity needs by the turn of the century.

GROSS ENERGY CONSUMPTION
(In Quadrillions of BTU s)



Estimate by Interior called for a total of 192 quadrillion BTUs in the year 2000. Half and Half plan requires but 121.

Therefore, even if energy from the Earth's heat, the sun's radiation and the fusion reaction are pushed along as fast and as far as possible (as they should be), they simply cannot solve our basic problem in the next 25 years, and we are left, inescapably, with the alternatives of coal and nuclear fission.

The United States has the world's largest supplies of coal and the most advanced nuclear technology. Both sources also have severe environmental problems associated with them, as SMITHSONIAN readers are well aware. Yet environmentalists must realize that when they oppose a particular solution to a basic social need, they must have an alternative. At present, these are the only alternatives in sight, so it behooves us to establish and enforce the proper environmental regulations for both of these sources.

With coal, how to mine it is the first

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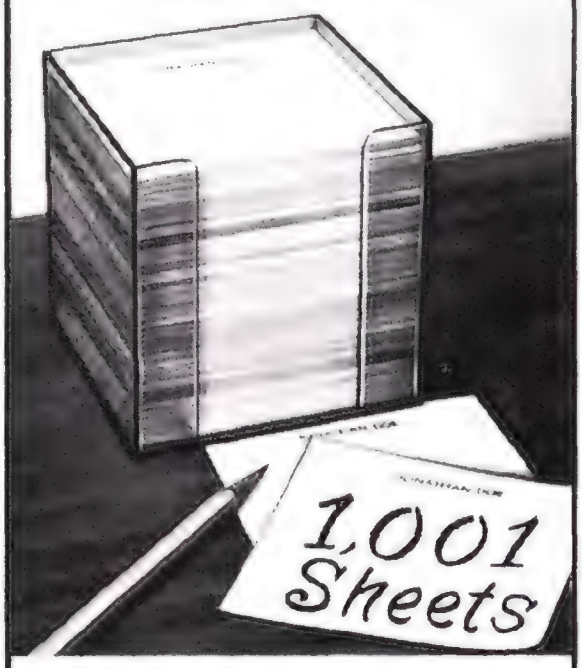

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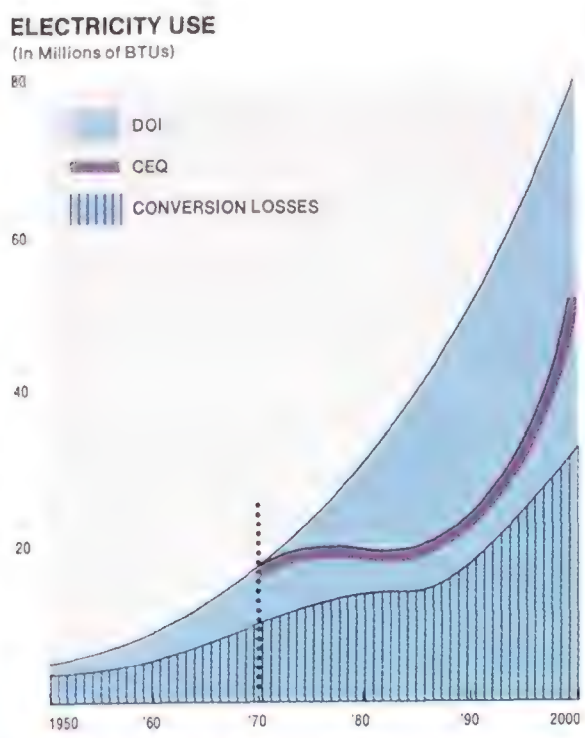
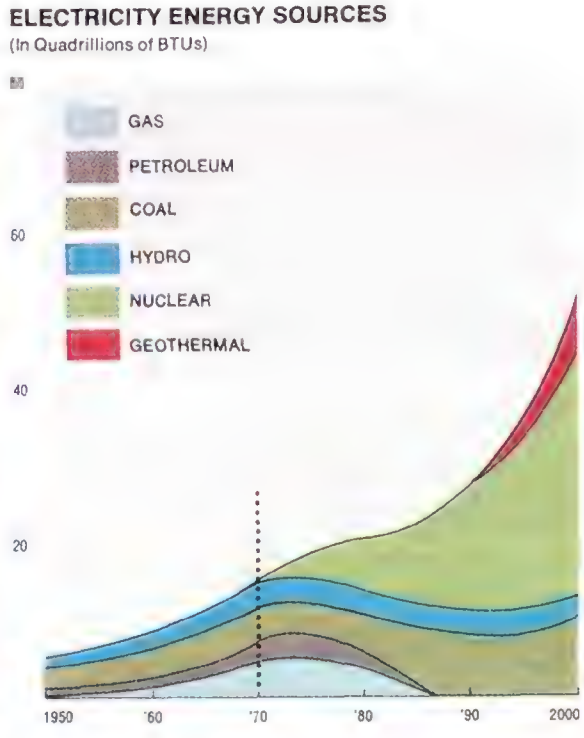
problem. Everyone has seen pictures of the ravages of strip mining, but not everyone knows that strip-mined lands—with the exception of relatively arid lands—





Greater use of coal and nuclear fission means far more energy consumed in form of electricity, entailing large losses in conversion process (left). At the right are electric sources. As petroleum tails off, fission becomes main factor.

can be reclaimed at reasonable cost. A study CEQ did a year ago showed that full restoration for Appalachian strip mines was achievable for about three to nine percent of the value of the extracted coal. As the value of coal rises, that percentage becomes even smaller. We must insist on full restoration.

Deep mining is environmentally less damaging but is extremely hazardous to the miners. Many coal companies have a horrible record in protecting the health and safety of the men underground, but others have good records. We need to develop new mining technologies and insist on the best safety practices.

However it is mined, we must burn coal in a way that minimizes the threat to our health from emissions of sulfur oxides. Fortunately, about half of our coal has low sulfur content; this should be allocated to densely populated areas. Furthermore, we must refine technologies for removing sulfur from coal. In Japan, stack gas scrubbers have worked successfully. And by the mid-1980s we can be converting coal to gas, extracting the sulfur in the conversion process and then piping the gas to individual homes for heating and cooling.

The development of nuclear energy poses a different type of environmental risk, centering on the safety of nuclear reactors and the safe custody of nuclear materials throughout the fuel cycle. Many persons, including myself, are therefore concerned about the projected growth of nuclear energy during the remainder of the century. My own feeling is that we need to redouble our efforts to build a greater safety factor into the design and operation of our nuclear plants and to insure greater protection from sabotage and from theft of material suitable for fabrication of nuclear weapons.

It is hoped that breakthroughs in solar energy by the 21st century may preclude the need for more fission reactions. In the meantime, we must not set a course which will require the construction of too many new reactors too quickly. The Half and Half Plan, for that reason, projects a total of 35 quadrillion BTUs of nuclear energy in 2000 as compared to 49.2 under the 1972 Department of Interior projection.

We must also focus more attention on the safeguarding and ultimate disposal of radioactive wastes (see SMITHSONIAN, April 1974). Currently, the mass of waste is still small, but even under the Half and Half Plan we will have hundreds of nuclear plants and therefore a great deal more waste products to deal with. We must therefore accelerate our efforts to

develop more acceptable methods of handling this material.

A greater reliance on coal and nuclear energy means that we will be moving more and more to electricity in the residential and industrial sector. Oil supplies will have to be reserved to meet transportation needs and for petrochemical feedstocks. The use of greater amounts of electricity in turn means greater losses of energy in the process of converting fuel to power (see graphs opposite). In other words, we will have to burn more and more fuel to produce the energy that we can actually use. It will also require more transmission lines extending across our countryside.

As a result of the shock of the Arab boycott last winter, there is considerable pressure these days to scuttle environmental constraints and go full-steam ahead to produce energy. Much of this pressure comes from those who fought the environmental movement in the first place and now see the present situation as an opportunity to win the battle they lost before. The Delaware Coastal Zone is an example.

When I was governor, Delaware already had extensive industrial areas and an existing refinery with room for expansion. We therefore decided that a 115-mile stretch of unspoiled marshes and beaches should not be developed for further energy facilities but should instead be preserved for their natural and recreational value. Now the pressures are building to reverse that decision. It would be a major mistake to give in. We need energy, but we need to protect our land.

It would be a mistake to trade an energy crisis for a health crisis.

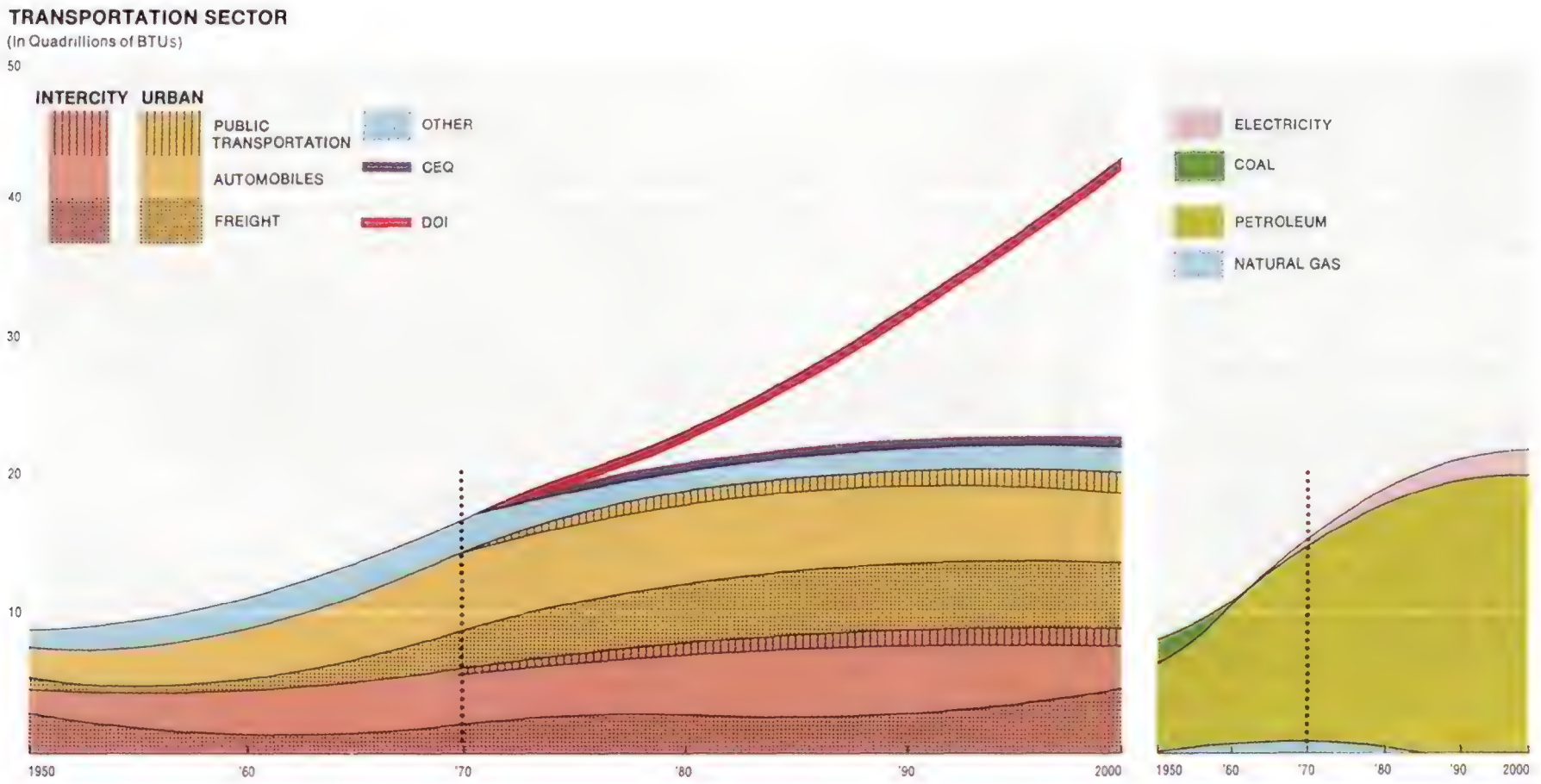
The United States, then, must make a decision about its energy goals to the end of the century. We can attempt to continue the pattern of energy growth of the recent past, or we can make a serious commitment to energy conservation. In choosing between these two alternatives we need to reflect upon the impact of this choice on our lives.

The poor in our society can make good use of more energy. Meeting their needs is important, and the growth included in the Half and Half Plan can permit them to share more fully in the benefits conferred by our energy-based economy. But for most Americans, I find it difficult to conceive how a large increase in energy would improve the quality of life appreciably, even before considering the environmental costs and risks associated with this choice.

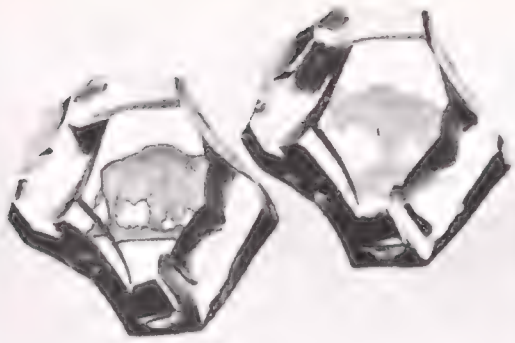
My vision of a future guided by the Half and Half Plan is of a nation undergoing some readjustments, but not fundamental ones. We would have to recycle our waste rather than continue to exploit virgin materials (recycling steel and paper, for example, requires 70 percent less energy), but this is manifestly desirable. We would have to become accustomed to smaller cars, and to walking more and driving less. We would be slightly cooler in the winter and slightly warmer in the summer, and we would turn off lights as we leave a room and consume fewer throwaway articles. Most important, we would all have to think about energy, as seriously as we now do about money. To my mind, few of these changes should provide any real discomfort.

Furthermore, a commitment to energy conservation may produce some unforeseen benefits. For example, as a continuing energy consciousness influences the planners and architects and citizens who create our homes and towns and cities, we are likely to find ourselves drawn more closely together. Instead of living in free-standing houses two miles from the store and 25 miles from work, we would move toward an intermixing of the various elements of our lives. The same will be true for our neighbors as well.

The end of profligacy in energy consumption may well force us to live with a greater sense of community—and we may just find that we like it.



Half and Half Plan calls for limited energy growth in transportation sector, achieved primarily through the use of smaller and more efficient automobiles. Limited petroleum stocks will have to be reserved to power these automobiles.



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Book reviews

Talleyrand: The Art of Survival
Jean Orieux
(Knopf, $12.95)

Respectable folk in Philadelphia were shocked when the French real estate agent strolled down the street with his beautiful black mistress on his arm. He was 40-year-old Charles Maurice de Talleyrand-Périgord (1754-1838), member of one of France's oldest, most aristocratic families, Bishop of Autun, friend of the great, and formerly one of the principals in the revolution which had shaken France and sent many of Talleyrand's peers to the guillotine. When the blade appeared dangerously close to his own neck, he prudently left the country, demonstrating not for the first or last time his remarkable ability to live dangerously and survive.

Included in his natural survival kit was an ability to acquire money—lots of it—whenever he needed it, which was always, for his ability to spend it matched his ability to get it. After the revolution, bribes were to be his major source of income, but in 1794, temporarily deprived of all his lands and wealth and being out of power, he turned to selling American real estate.

In his long life he was to serve as head of the foreign office, prime minister or ambassador to England in every French government from the Directory to that of Louis-Philippe. He justified serving the Directory, Napoleon and the Bourbons by saying that his allegiance was not to any government but to France. He had a remarkable talent for fine distinctions. It helped to make him the shrewdest negotiator and the most talented diplomat in Europe. He "never confronted events, he exploited them."

The author makes a case that Talleyrand actually did further French interests, that he "created an independent Belgium, broke up the Holy Alliance, made England an ally, and upheld liberty." And his program for public education was "unquestionably his most humane and commendable achievement."

Talleyrand's character was even more extraordinary than his achievements. He maintained a "sublime indifference to danger, to calumny, to failure," and he faced all three many times. Indeed, the stream of calumny ran continuously. Mirabeau called him a "vile, greedy, base and conniving" man and George Sand called him "a man destined for great vice and petty acts." Great vices he had, but he was never petty. All of the political masters he served subjected him to the most dreadful humiliations, but he was scarcely even embarrassed.

He was a gambler and a voluptuary, he possessed an overwhelming cupidity, he violated his sacred vows, and he fathered illegitimate children (among them, according to rumor, the painter Eugène Delacroix). Talleyrand was a "moral invertebrate," yet, as one of his friends said, "Who could escape loving him? He is so unprincipled!"

As a dying old man he returned to the bosom of the church, but not as a humble penitent. His dying was managed as he had lived: by negotiation. He made a deal with the Church, staging "the century's most theatrical death."

Jean Orieux's style may repel some: No biography ever contained so many rhetorical questions; the author moralizes outrageously; he talks back to his characters—to Talleyrand, to Napoleon; he berates previous biographers; and his elegant variations on Talleyrand's name are endless—"our hero," "our Maurice," "our minister." Nevertheless, he has brought an extraordinarily complex man to life and has made his implausible character seem credible.

—Byron Farwell
Author of *Queen Victoria's Little Wars*

The Aztecs
Nigel Davies
(Putnam, $10)

The Aztecs and Incas are probably the best known of the many peoples who

occupied the Americas at the time of European contact. Numerous books have been written about their origins, cultures, conquests and downfalls, yet they continue to provoke interest. One reason is the seeming incongruity in the defeat of these large and populous empires by a handful of poorly equipped men, who were the first to remark that they had seen nothing as magnificent back home.

This book by Nigel Davies—an Englishman and one-time member of Parliament, who has lived in Mexico since 1962—reconstructs the story of the Aztecs from their beginnings in northwestern Mexico about A.D. 1100 until their disappearance as a recognizable entity in the late 16th century. The author has reviewed many documents, evaluated the facts, considered conflicting data, and pieced together an account that makes fascinating reading. The saga begins with the exodus of a small group of people and follows their wanderings through the decades to the Valley of Mexico. Finding it already occupied, they settled in temporary and sometimes desolate habitats until they were advised by their god to establish themselves in about 1345 on an island in Lake Texcoco, which became the capital of Tenochtitlán.

Their gradual development from a disdained minority to masters of an area that stretched from sea to sea is described in considerable detail. The reader learns about a political system, standards of morality and conduct, attitudes toward wealth and the uses of power that were markedly different from those of our own society. Conquered peoples were obliged to pay tribute, but usually allowed to keep their own cultures and leaders. This tribute was not hoarded by the emperor to be passed on to his heirs, but was distributed; generosity, expressed in ways similar to the potlatches of the Pacific Northwest, brought prestige.

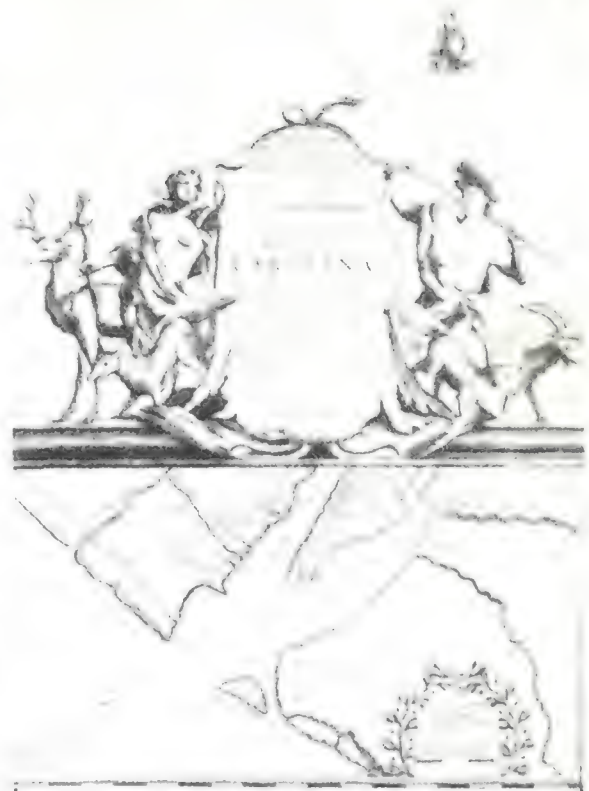
By contrast with European norms, the Aztecs were puritanical; adultery and drunkenness, even certain kinds of theft, were punished by death. They also practiced human sacrifice on a massive scale. Davies explains these customs, their importance to Aztec society, and their significance to the people. Sacrificial victims, apparently, did not feel persecuted; rather, they considered themselves honored to be chosen.

The text follows a chronological order, emperor by emperor, making it easy to follow the sequence of events. The author manages to introduce much information on the process of empire building—the function of trade as a prelude to conquest, the methods of warfare, the role of omens and other supernatural factors, the way in which alliances with other groups contributed to the success and, ultimately, to the downfall of the Aztecs.

Where the sources disagree or their interpretation is puzzling, Davies often analyzes the alternatives and suggests the one that seems to him most probable. Notes and references provide additional data for the serious scholar. The result is a readable account of a remarkable episode in the history of the Americas. I doubt that anyone can close the book without regret that so much has disappeared.

—Betty J. Meggers
Research Associate, Department of Anthropology, National Museum of Natural History, Smithsonian Institution

Aperriamento—"dogging"—was among Spanish tortures inflicted on Aztecs.



BRITISH MAPS of COLONIAL AMERICA
William P. Cumming

This beautiful collection of maps—many published here for the first time—illustrates the great period of English mapmaking in North America, culminating in the brilliant cartography of the Revolutionary War years.

Of particular importance are Earl Percy's maps of the American Revolution, the maps of Sir Francis Bernard who was royal governor of Massachusetts, and the headquarters maps of Lord Jeffrey Amherst.

The accompanying text provides much new information on the historical and political significance of the maps and on individual mapmakers and their methods.

The first two sections of the book explore the expanding knowledge of the Southern and Northern British Colonies; the third follows the charting of the coast from simple beginnings to professional accomplishment; the fourth is concerned with the "cartography of conflict," maps relating to the French and Indian War, and the Revolution. A bibliographic essay provides sources of further information on this fascinating subject.

Published for the Herman Dunlap Smith Center for the History of Cartography, the Newberry Library. $10.95

Illustration: Fragment from *A New Map of the Country of Carolina*, Joel Gascoyne. Courtesy Yale University Library.

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The Library of Congress
Charles A. Goodrum
(Praeger, $10)

For those of us whose minds unhinge at the sheer immensity of the Library of Congress, with its maze of corridors, multilayered stacks and circuitous subterranean passages, this study will prevent many a false step. This largest library in the world houses some 64 million pieces on shelves and in vaults. The behemoth seethes with the bustling of 4,000 employees, serving a million visitors a year and answering 1,500 daily inquiries from Congress. Among its unheralded products, for example, are computer tapes, book cassettes for the blind, newsreels for television documentaries and translations of court cases from Iron Curtain countries.

Charles A. Goodrum gives credit to the bookish Founding Fathers for establishing a national library, despite the typically disgruntled taxpayer who thought it "absurd to squander away money for a parcel of books." A $5,000 order for 740 volumes went off to London in June 1800, and a librarian was engaged at $2 a day. In 1814 British soldiers burned the Capitol, along with its infant book collection. Thomas Jefferson saved the day by offering for sale his fine 6,000-volume library. Fire again threatened the "Treasure House of the World's Knowledge" in 1825, when Daniel Webster was among those who extinguished the blaze, and in 1851 when the Marines came in, too late to save two-thirds of the collection.

Although the Capitol dome was soon crammed with books, it took 30 years, until 1897, for librarian Ainsworth Rand Spofford to see the reality of his vision. The magnificent quasi-Italian edifice we know today, constructed of marble from Verona, Siena, France and Tennessee, was his design. The circular core of the building was intended to facilitate the flow to and from the center, so that "only a single spoke need be shifted, rather than great masses of books as is required if books are in rectangular ranks."

Spofford's greatest contribution, however, was in seizing the ball from the burgeoning Departments of State and Interior, as well as the Smithsonian Institution, by taking control of the copyright in 1870, thus confirming the Library of Congress as *the* national library to which all new works would automatically flow.

Unfortunately, by 1900, Spofford's abysmal cataloguing system had classified but one-third of the 740,000 tomes on hand, and it took the genius of Herbert Putnam to comprehend that the Dewey Decimal System was inappropriate for so large a collection. An entirely new system had to be devised. Goodrum explains how the superior flexibility of the Library of Congress system facilitates classification of new branches of knowledge.

The author's primary aim is to clarify the functioning of the Library, which—as assistant director of the separately budgeted Congressional Research Service—he is particularly qualified to do. He clearly explains how collections are acquired and controlled, how 9,000 new subject headings are established each year. He describes with near reverence that treasure of incunabula, the Gutenburg Bible, one of three extant vellum copies; the collection of rare music manuscripts ranging from Bach to acid rock; the five Stradivari instruments so prominent in admission-free concerts.

To whom does the Library finally belong? Congress, the nation's libraries or the scholars who use it? Goodrum cites a comparison to a beer and ale trademark, three interlocking circles symbolizing a triple mission, with its overlapping center standing for its multifaceted processing service. Goodrum gives the Library high marks for efficiency. With this compendium in hand, no researcher should question the Library's eminent quality or find himself unguided in its labyrinthine processes, even if they seem lengthy.

—Louise Sheldon Smith
Associate Editor, SMITHSONIAN

Taming the Last Frontier
C. W. Griffin
(Pitman, $8.95)

The last frontier, according to engineer-journalist C. W. Griffin, is neither outer space nor the 49th state but the American city. In his "prescription for the urban crisis," Griffin argues that the American frontier ethic, lingering long past its time, has been the ruination of the cities. This ethic, he writes, makes a religion of unbridled growth, of rugged individualism running roughshod over the public good and of public policies that underwrite these selfish interests.

The responses Griffin espouses are drastic. Some will find them outrageous, for they run smack against the values

that remain as cherished in America as they may be outdated. The right to a large family, the concept of local governmental supremacy, the right to speculate in land, the right to pollute in the name of progress and prosperity—all are passé, according to Griffin.

For years, Griffin says, governmental policies have subsidized such rights through a variety of special taxes, exemptions and allocations of public monies. "In any direction you look," Griffin writes, "you see economic rewards for the spoilers and economic penalties for social benefactors." It is time, he declares, for a Great Reversal: Tax air and water polluters, tax vacant land to discourage speculation, abolish tax exemptions for more than two children, impose car commuter taxes so high that mass transit becomes the preferred alternative.

All of this is fine. There is an underlying assumption here, fashionable in the 1960s but open to at least some question in the 1970s. It is that the cities are dying, losing out to the suburbs. It was out of this, based on hard realities documented during Great Society days, that the facile phrase "urban crisis" was born.

There are now some signs that forces unimagined in the crisis-ridden Sixties are both undermining the frontier ethic and working in favor of the cities, without contrived intervention.

Economics, for example, are replacing the space-wasting suburban single houses with town-house clusters. The uncertainty created by the energy crisis makes mass transit and in-town living look more and more attractive to many families. Central city realtors report increased interest, while many suburban homes remain unsold on the market.

Finally, the suburban escape hatch has proved illusory, since urban problems—crime, drugs, pollution, congestion and racial tensions—have spilled across the artificial political boundaries of the central core.

Griffin is on target in his criticism of local and national policies. He writes crisply and with a sense of urgency. In what now seems like the distant past (although only a few years ago), this book would have been a shocker. Today, it is a book about the "urban crisis," with radical solutions to *yesterday's* problems.

—Eugene L. Meyer
Washington Post reporter who has written extensively about cities

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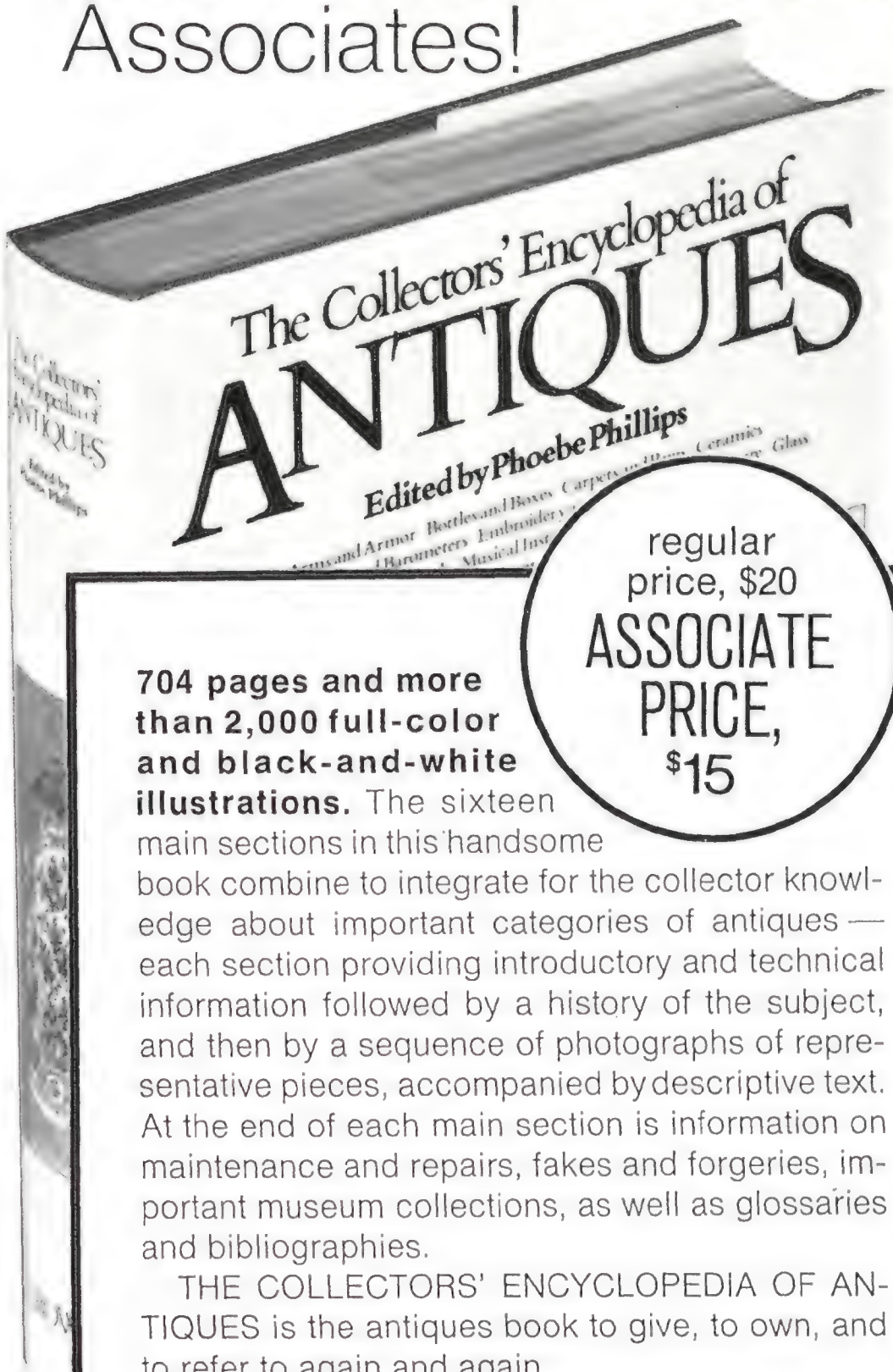

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The eighth annual Festival of American Folklife is a celebration of traditional American folk culture, sponsored by the Smithsonian Institution and the National Park Service, July 3-7 and July 10-14 with limited concert performances July 8-9. Hours are 11 A.M.-5 P.M. with scheduled evening concerts. The admission-free Festival, located on the 50-acre site between the Washington Monument and Lincoln Memorial, is divided into four main theme areas:

• "Regional Americans" includes fiddlers' contests and conventions; craft demonstrations and auctions; gospel, sacred harp, survival fife and drum music; and agricultural areas of cotton, timber and cattle. The Festival's featured state is Mississippi.

• "Native Americans" presents 15 Indian tribes from all parts of the country participating in sports and games, such as canoe racing in the Reflecting Pool; craft demonstrations; food preparation; and a workshop in non-verbal communication.

• "Old Ways in the New World" includes participants from Norway, Finland, Sweden, Tunisia, Greece, Ghana, Trinidad and Brazil, brought together with Americans of kindred ethnic background through dance, song and culinary traditions. "The African Diaspora," representing the origins and traditions of American black culture, is a separate section within the "Old Ways in the New World" theme.

• "Working Americans" demonstrates the skills and folklore of postal workers, radio broadcasters, telephone operators and linemen, cable splicers, graphic artists and lithographers.

A special new "Childrens' Area" offers opportunities for participation in games, storytelling, pony rides, hayrides, dress-up parades and sandcastle-building. Beverages and native foods, from fried catfish and barbecued chicken to Finnish pastries, are available. Public transportation is recommended, but parking is available along the Mall and in an area on 19th Street and Constitution Avenue, N.W.

The fiddler (above) expects to make a return engagement with "Regional Americans" at the Folklife Festival.

Renwick Gallery
"Man Made Mobile: The Western Saddle" is an exhibition of 20 saddles depicting the evolution of their design from the first saddles brought to the Western world by the Spanish conquistadores. In addition to showing changes in saddle forms and ornamentation, the exhibit demonstrates through slide presentations the use of the saddle in other cultures, and the extension of the saddle idea into other mobile seating forms such as bicycle and tractor seats and molded astronaut couches—opens July 1.

Museum of Natural History
"Jewelry Fit for a Queen" is a new exhibit of dazzling objects from historic to modern times (see SMITHSONIAN, June 1974). Included are Marie Antoinette's 36-carat diamond earrings, the silver-and-diamond tiara which was Napoleon Bonaparte's gift to his wife, a ring set with the finest emerald on display anywhere in the world, and Marjorie Merriweather Post's elaborately jeweled evening bag. The extraordinary and glamorous collection of rubies, diamonds, sapphires, emeralds, opals and pearls is displayed in the second-floor Gem and Mineral Hall—opens first week in July.

Puppet Theater,
Arts and Industries Building
"What If?" is a puppet space fantasy presented Wednesday through Sunday at 11 A.M. and 1 and 2 P.M. Children under three not admitted. For ticket information, call (202) 381-5395.

National Portrait Gallery
The first major Smithsonian Bicentennial exhibition, "In the Minds and the Hearts of the People: Prologue to the American Revolution," documents the turmoil and discontent of the Colonies in the years preceding the Revolution. Eighteen detailed Georgian settings of furniture and decorative items serve as display rooms for the art, documents, maps and cartoons. Included are many paintings, such as Allen Ramsey's portrait of George III, never previously shown in this country.

Summer Museum Hours
The Arts and Industries, Air and Space, History and Technology and Natural History Buildings are open daily from 10 A.M. to 9 P.M. All other museum buildings close at 5:30 P.M.

Traveling Exhibition Service

There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Charleston, South Carolina—"A Children's World" (The Charleston Museum, July 14-September 1).
- Cooperstown, New York—"Children in Bondage" (New York State Historic Association, July 7-August 25).
- Jackson, Mississippi—"Our Only World" (The State Historical Museum, July 6-August 4).
- Oshkosh, Wisconsin—"200 Years of Royal Copenhagen Porcelain" (The Paine Art Center and Arboretum, July 27-September 1).
- Montgomery, Alabama—"Mary Bruce Sharon, An American Primitive" (Montgomery Museum of Art, July 27-Aug. 25).
- Fort Wayne, Indiana—"Permutations: Earth, Sea, Sky" (The Fort Wayne Museum of Art, July 27-August 25).
- Decorah, Iowa—"Folk Paintings from Dalarna" (The Norwegian-American Museum, June 29-July 28).

Smithsonian Commons

Located in the original Smithsonian Castle building, the Commons offers a buffet luncheon and salad bar from 11:30 A.M. to 2 P.M. ranging from $1.60 to $2.25. Also available are coffee and pastries from 10 to 11 A.M. An Associates card is required—open Monday through Friday.

Parking on the Mall

Metro construction has made parking on the Mall near the Smithsonian complex extremely difficult. All parking prior to 10 A.M. is restricted. The use of public transportation is recommended.

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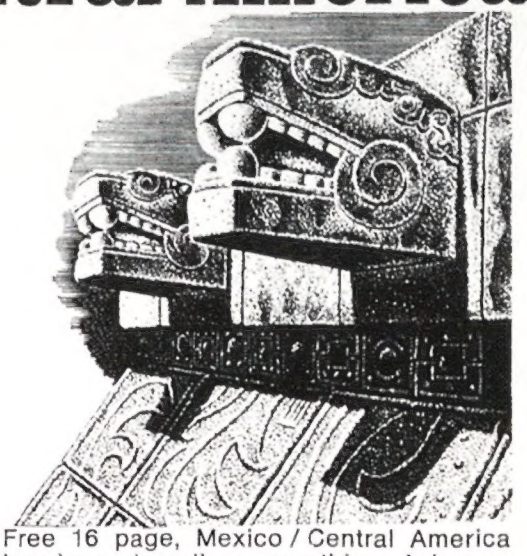

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By Patrick Ryan

The early bird only catches the wrong train

Whatever other complex peculiarities of color, creed or plain cussedness may separate the human race, one basic schism is detectable which divides us all. When the Almighty breathed on the original handful of dust, He apparently made a broad division of the outcome into the compulsively early and the congenitally late. The former have the approbation of Sir Winston Churchill, who growled that "Unpunctuality is a vile habit," while the latter can find justification in the philosophy of Mayor Jimmy Walker of New York, who proclaimed, on arriving vastly late for a public dinner, that "if you're there before it's over, you're on time."

My own ménage is a simple example of the timekeeping dichotomy of our species. My highly developed sense of insecurity impels me to approach all appointments with at least half an hour in hand. My wife, in marital perversity, insists on aiming to arrive at any temporal engagement one split second before takeoff. She invariably gets to railway stations just as the whistle blows for the departure of her train. She never misses a train, however, mainly because I am usually on hand to hurl luggage through windows, hold open accelerating doors, or lug her inside by her hair. I, on the other hand, like Sigmund Freud, am endowed with a fair helping of *Reisefieber* (or fear of traveling), which leads me to arrive at the station with at least 40 minutes in hand for coffee and perspective-juice. Ingloriously, however, I miss more trains than she does because, too often, it is the wrong station.

If the Archangel Gabriel should knock on our door one day and say, "All out, it's the End of the World at half-past five," my wife wouldn't even start putting on her face properly until 5:29. This is why, wherever she may be driving, it always appears to be to a fire.

Returning to the railways, it is relevant to recall that Aldous Huxley laid something of the blame for the clock-consciousness of 20th-century mankind upon their invention. Before the advent of the railway timetable, the business of life was governed mainly by the chiming of clocks and was generally conducted in comfortable approximations of a quarter of an hour. "To us," Huxley observed, "the moment 8:17 means something—something very important if it happens to be the starting time of our daily train. To our ancestors, such an odd eccentric instant was without significance—did not even exist. In inventing the locomotive, Watt and Stephenson were part inventors of time."

As to why higher primates should divide into the punctual and the unpunctual, you are free to pay your money and take your superstitious choice. An astrologer holds that, in general, people born under the signs of Aries, Gemini, Libra, Sagittarius, Aquarius and Pisces will keep you waiting under the clock more often than not. Since this apportions half of the zodiac to the tardy and leaves the other half for the timely, it fits well with what seems to be the more or less standard astrological practice of always forecasting on a 50-50 chance.

Freudian psychiatrists, however, no doubt keeping in their minds' eyes the image of their inventor trudging with an hour to spare up and down Austrian railway platforms, presume to trace our temporal schism back to childhood. They claim that habitual latecomers are actually rebelling against their parents as authority figures, and express this aggression as adults by refusing to obey the authority of the clock. The compulsive arrivers-before-time also harbor the same desire to rebel against authority but meekly suppress the urge and submit to the commands of tradition, society and the remorseless clock. Which indicates that, down on the expensive couch, there is little difference between the early and the late.

When Gabriel does blow that Final Trump, my wife won't be able to take the supreme prize for unpunctuality, because it has already been won a few years ago by a resident of Oldham, in the north of England, who chanced to die in Bodmin, many miles from home. And who later sparked that immortal Question in the British Parliament, in which the Honorable for Oldham West asked the Postmaster General "whether he will hold a full enquiry into the circumstances in which the ashes of an Oldham citizen who died on holiday and was cremated at Bodmin were not delivered by post in Oldham in time for the interment." Thus, this Oldham citizen, willing or not, achieved the ultimate in unpunctuality by becoming the only person on official record to be late for his own funeral.

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